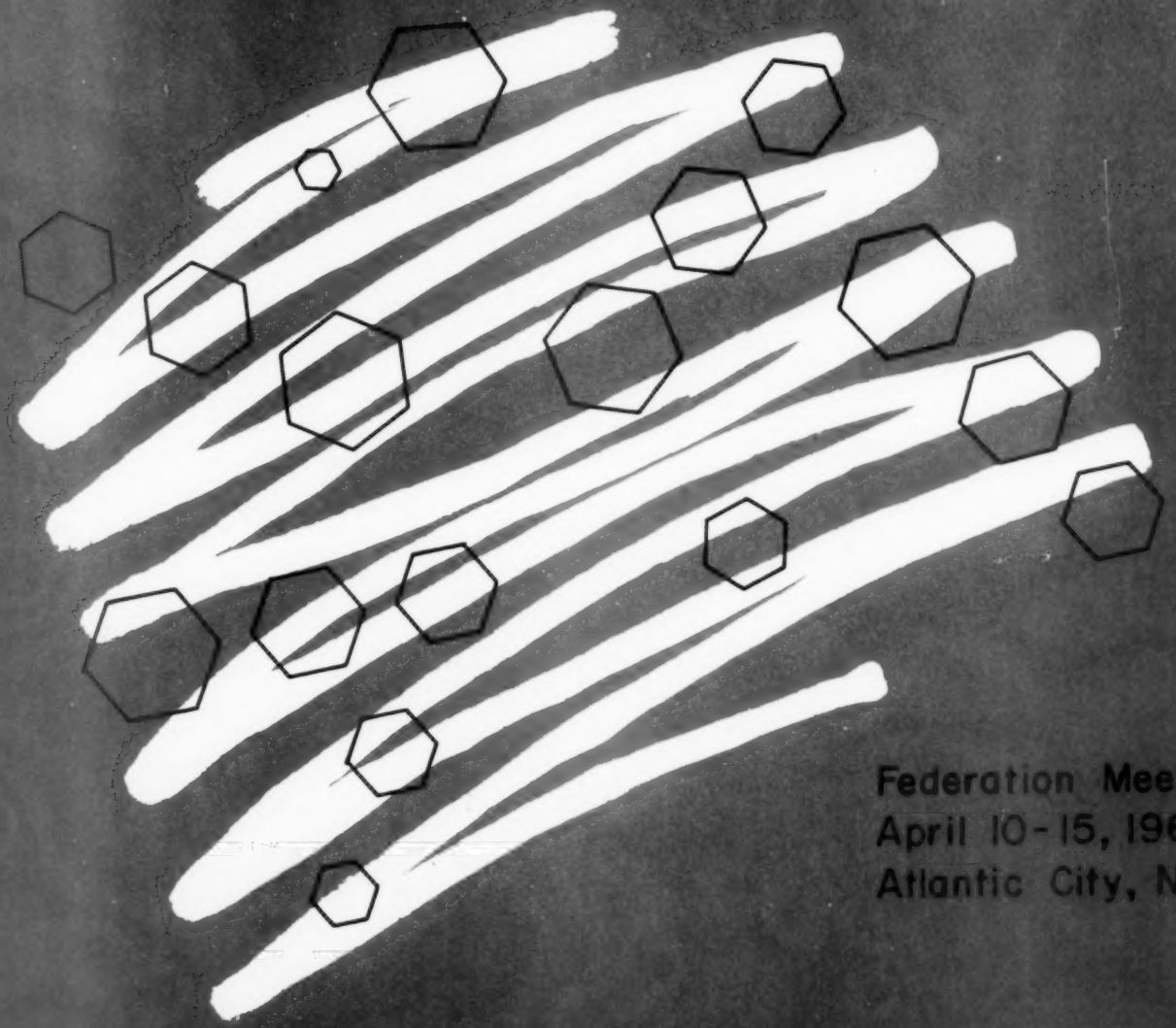
SPRING 1961

THE PHARMACOLOGIST



Federation Meeting
April 10-15, 1961
Atlantic City, N.J.

Vol. 3, No. 1

THE AMERICAN SOCIETY FOR PHARMACOLOGY & EXPERIMENTAL THERAPEUTICS, INC.

Beaumont House Washington, D.C.

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COVER BY: Laura Casey Steltz

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COVER STORY - "THE PHARMACOLOGIST"

Literally, the last thing that Laura Casey Steltz did last fall before taking off for Alaska to join her husband in his new work there was to complete the Cover for this issue of "The Pharmacologist." Mrs. Steltz had been an artist on our research staff for several years. She took pleasure in the imaginative creation of all the covers of "The Pharmacologist," beginning with its present format.

Her assignment was to create a cover that was distinctive and in good taste, sufficiently abstract to attract speculation but not resentment, neither obvious nor quite like anything on the scientific reading shelves of a library, something to represent Pharmacology as visionary rather than historical in its outlook.

In the full measure that she has succeeded in fulfilling this assignment she has contributed significantly to the welfare of Pharmacology. Those of us who remain to turn out one more issue, and I'm sure the Society as well, express our appreciation of her fine work and wish her well.

Karl H. Beyer, Secretary

Additional copies of this issue may be obtained from Dr. Karl H. Beyer, Merck Sharp & Dohme Research Laboratories, West Point, Pa. Price: $1.00.

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ELLSWORTH B. COOK - EXECUTIVE OFFICER-(ELECT) OF THE SOCIETY

The officers of the Society are pleased to announce the appointment of Ellsworth B. Cook, Ph.D., to the position of Executive Officer of the American Society for Pharmacology and Experimental Therapeutics, effective on or about October 1, 1961, following his retirement as Commander MSC USN.

Commander Cook received his Ph.D., with a major in Pharmacology, from Tufts Medical School in 1951, having previously studied in the fields of physiology, neurophysiology and psychology at Clark University, Duke, Harvard and Yale. He has published or contributed to over 60 articles, some of which were necessarily of a confidential nature.

Dr. Cook became known to many of our members while he was stationed at the Naval Medical Research Institute in Bethesda. While there, he served first on the N.I.H. Study Section on Cancer Chemotherapy and then transferred to the Study Section on Pharmacology and Experimental Therapeutics when that panel was established. He has had a wide experience in editing, lecturing and in liaison and contact work, including the organization of conferences. Commander Cook's familiarity with scientific affairs in Washington is, of course, a real asset to him and to the Society, since he will have his office at Beaumont House, Bethesda, Maryland.

As Executive Officer of the Society, he will be charged with the ongoing managerial affairs previously delegated particularly to the Secretary and the Treasurer. The responsibilities of these officers of the Society will become henceforth more of a supervisory or advisory nature.

Commander Cook is 45 years old and is married. It is anticipated that he will become a member of the Society at the 1961 Spring Meeting. He will be formally introduced to the membership at the first Business Meeting of the 1961 session in Atlantic City.

OBITUARY - PAUL K. SMITH

It is with deep regret that we must report the untimely passing of Paul Kenneth Smith, Professor and Executive Officer of the Department of Pharmacology of The George Washington University School of Medicine. Dr. Smith died unexpectedly on October 6, 1960, following a coronary attack. His age was 52. He leaves his wife, three children and two grandchildren.

Born in Missouri, Dr. Smith received his B.A. from Westminster College and his Ph.D. from Yale. After teaching at Yale as an Assistant Professor, he left in 1941 to join the Air Corps and became Chief of Pharmacology and Biochemistry of the Army Air Force School of Medicine, Randolph Field, Texas. He was a Colonel in the U. S. Air Force Reserve. He became Professor and Executive Officer of the Department of Pharmacology of The George Washington University School of Medicine in 1946, and since that time, in addition to his regular teaching duties, he had supervised the training of some 30 Ph.D. candidates in Pharmacology.

Dr. Smith was widely known for his earlier work on electrolyte and water metabolism, and physical chemistry of amino acids. Thereafter, his interest centered largely on analgesic drugs, especially salicylates, and the control of motion sickness. His contributions have helped reveal some of the underlying pharmacological concepts on the chemotherapy of cancer and of virus diseases. His biochemical approach to pharmacology has emphasized studies on drug metabolism in an effort to explain the action of drugs. He was the author of approximately 120 full research papers, a monograph on Acetophenetidin and 14 reviews or chapters in textbooks. He left unfinished another monograph on Salicylates.

Dr. Smith's dedication to pharmacology was expressed by his active participation in the American Society for Pharmacology and Experimental Therapeutics. After three years of being Councilor, he had just become Secretary-Elect. He was an editor of Aerospace Medicine. He also belonged to a variety of additional organizations, including the American Society of Biological Chemists, the American Society for Experimental Biology and Medicine, the Aero-Medical Association, the American Association for Cancer Research and the American Association for the Advancement of Science. He was a member of Sigma Xi, the St. Andrews Society of Washington, the Phi Chi Medical Fraternity, the Yale Club of Washington and the Cosmos Club.

To his many friends, "P.K." will be remembered for his warmth, exceptional ability and wisdom, and unselfish help to others. He thoroughly enjoyed working at a vigorous pace, necessitated by all the goals and interests that motivated him. His common-sense approach to all problems, scientific or human, was of infinite value to those of us who were fortunate enough to know him. His refreshing sense of humor and his enthusiastic support of the interests and ambitions of younger scientists made him a most beloved Chief. We will miss him sincerely.

H. George Mandel

H. GEORGE MANDEL - SECRETARY-ELECT

The officers of the Society are pleased to announce the election of Dr. H. George Mandel, to succeed the late Dr. Paul K. Smith to the position of Secretary-Elect of the American Society for Pharmacology and Experimental Therapeutics.

Following the untimely death of Dr. Smith, the Nominating Committee was requested by your president, Dr. Gilman, to submit the names of three candidates to the Council to act for the Society in filling this vacancy in its ranks. It was desirous that this action be taken promptly so that the newly elected Secretary-Elect might have the benefit of working with your Secretary and the Executive Officer-to-be, Commander Cook, in setting up the arrangements for the 1961 Spring Meeting.

Your Council elected Dr. Mandel to succeed Dr. Smith as Secretary-Elect. He also succeeds Dr. Smith as Professor and Executive Officer of the Department of Pharmacology, The George Washington University School of Medicine, Washington D. C. Dr. Mandel is an unusually able younger member of our Society. He was an Abel Award winner in 1958. We are fortunate, in that when Dr. Mandel becomes Secretary of the Society both he and Dr. Cook, as Executive Officer, will be located sufficiently close together as to make the interaction of their new duties less difficult.

NOMINEES

The Nominating Committee has selected the following candidates for office in the American Society for Pharmacology and Experimental Therapeutics for 1961-62:

President-Elect (1-year term)	Oliver H. Lowry H. B. van Dyke
Treasurer-Elect (1-year term)	James A. Bain Jurg A. Schneider
Councilor (3-year term to replace Robert M. Featherstone	Lawrence Peters Klaus R. W. Unna
Membership Committee (3-year term to replace George B. Koelle)	Herbert L. Borison John J. Burns

The election will take place during the first business meeting of the Society in Atlantic City in Borton Hall in the Dennis Hotel on Tuesday, April 11, 1961, at 4:30 p.m.

PROPOSED AMENDMENT TO THE CONSTITUTION, ARTICLE IV. Officers

Department of Pharmacology
Cornell University Medical College
1300 York Avenue
New York 21, N. Y.

January 19, 1961

Dr. Alfred Gilman
Professor and Chairman
Department of Pharmacology
Albert Einstein College of Medicine
New York 61, New York

Dear Dr. Gilman:

You will recall having raised certain questions about the adequacy of the present Article IV, particularly Section 6, to define procedure in the event that certain interim Council vacancies occur. This was especially emphasized by the unfortunate and untimely death of our Secretary-Elect, Dr. P. K. Smith.

In accord with your request a committee has been formed to examine Article IV of our Constitution. This committee, composed of Drs. McKeen Cattell, Robert F. Furchgott, Leonard Procita, Jay Roberts and myself as chairman, have carefully studied Article IV and have found it to be deficient with respect to definition of the filling of interim vacancies on the Council. Accordingly, we have re-drafted Section 6 and this now is comprised of Sections 6A, 6B and 6C. As a consequence of this we have found it necessary to modify slightly Sections 2 and 3.

The proposed revision of Article IV is enclosed and the reasons for each of the changes are also outlined. We, the undersigned, believe that the proposed revision improves our Constitution and therefore recommend that you notify the Society membership, so that they may have opportunity to consider this matter prior to our forthcoming meeting.

Sincerely,

/s/

Walter F. Riker, Jr., M.D.

Also signed by: Robert F. Furchgott
Leonard Procita
Jay Roberts

- -

The proposed revisions to Article IV are published below and will be submitted to the Society for action at its first business meeting to be held on Tuesday, April 11, 1961, at 4:30 p.m. in Borton Hall in the Dennis Hotel in Atlantic City at the time of the Federation Meetings.

Proposed Amendment, Article IV

SECTION 2.

Present Form: The President-Elect, either the Secretary-Elect or the Treasurer-Elect, and one other Councilor shall be elected at each annual meeting and shall assume office on July 1 or January 1, whichever occurs first after their election.

Proposed Revision: The President-Elect, either the Secretary-Elect or the Treasurer-Elect, and one other Councilor shall be elected at each annual meeting and shall become members of the Council on the following July 1.

Comments: The changes in Section 2 indicate first that the officer-elects shall become members of the Council, since they do not actually assume office until one year after election. Also the date of July 1 is specified in accordance with the Federation By-Law (Art. I; Sect. I), "The Federation Board shall consist of three representatives from each of the constituent Societies, each of whom shall serve for a term of three years, such term to commence on July 1."

SECTION 3.

Present Form: The President-Elect shall become President after one year as President-Elect or upon the earlier death or resignation of the President, and two years after assuming office as President-Elect, he shall become Past-President for one year.

Proposed Revision: The President-Elect shall become President after one year as President-Elect, except as otherwise provided in Section 6A. He shall continue to serve as President until two years after having assumed office as President-Elect, at which time he shall become Past-President for one year.

Comments: Section 3 has been rewritten omitting the provision for the succession of the President-Elect, since this is provided for in Section 6A. Furthermore, the rewording assures that a President-Elect who becomes President prematurely continues in that office until the date that he would ordinarily have become Past-President.

SECTION 6.

Present Form: Vacancies on the Council or committees which occur between annual meetings shall be filled by a majority vote of the Council. The persons so chosen shall serve until the next meeting of the Society, at which time the vacancies shall be filled by election.

Proposed Amendment, Article IV

SECTION 6.

Proposed Revision: SECTION 6A. If the office of President, Secretary or Treasurer becomes vacant, the corresponding officer-elect shall succeed to office.

SECTION 6B. Vacancies on the Council or elected committees shall be filled in one of two ways, as determined by the Council: Candidates nominated by the Nominating Committee either may be elected at the next meeting of the Society or in the interim by majority vote of the Council.

SECTION 6C. A nominee selected by the Council to maintain its number, when vacancy is created in the office of either the Past-President, President, President-Elect or Councilor, shall be designated a Councilor. He shall serve until the vacancy is filled by election at the next meeting of the Society.

The Council, in accordance with Section 6B may designate a Secretary, Secretary-Elect, Treasurer or Treasurer-Elect to serve for the unexpired term of the vacated office. A Secretary-Elect or Treasurer-Elect so chosen shall succeed to the corresponding office.

Comments: Section 6A simply furnishes a unified provision for succession of officers. There is now no such provision in the Constitution. Section 6B permits the Council to evaluate the surrounding circumstances in any exigency and to decide the best way to cope with the problem. This provision is essentially similar to the less explicit statements in the constitutions of the other societies. The intent of Section 6C is to prevent the Council from electing a President-Elect, President, or Past-President. This should be a privilege of the Society. Consequently an interim vacancy in any of these positions could be rectified by the election of an additional Councilor. In this way the Council number can be maintained at nine. However, this section does permit the Council to elect a Secretary, Treasurer, Secretary-Elect or Treasurer-Elect, since these positions are critical to the routine affairs of the Society. It is also evident from this that a Secretary-Elect or Treasurer-Elect could be elected by Council immediately after his predecessor had filled a vacancy in accord with Section 6A. However, regardless of the reason for Council election of a Secretary-Elect or Treasurer-Elect, Section 6C allows this individual to succeed to the pending office, exactly as if he had been elected by the Society. This seems only proper, if he has served an apprenticeship with the purpose of preparing himself to serve the Society as either Secretary or Treasurer.

REGARDING A CHANGE IN NAME OF THE SOCIETY

In this issue of "The Pharmacologist" you will note both a draft of an Amendment to the Constitution of the Society and an editorial by Dr. Edward F. Domino pertaining to a change in the name of the Society.

The members will recall that a similar amendment was presented for vote at the first business meeting in the Spring 1960, after the unanimous endorsement of the change in name by your Council. A prior mailing, dated November 10, 1959, solicited the attitude of the membership with regard to a change in name. The response to that mailing and the vote at the business meeting indicated an overwhelming approval of the change.

Indeed, 78 per cent of those in attendance at the first business meeting, Spring 1960, voted for the change in name - 2 per cent short of the 4/5 vote required by the Constitution for the change to be effected. At that time, the reasons for and against the change were debated, and in that discussion Dr. Domino presented much the same argument as set forth in his editorial. The points he has mentioned in the following editorial will be considered by some to be neither an entirely adequate nor a wholely unbiased presentation. Its presence, however, attests to his sincere interest in the affairs of the Society and his effort to elicit an open support for the position he would take. His editorial received a broader circulation than represented by those who have endorsed it.

Dr. Domino's request to have this published was received too late to solicit one or more similar statements that would round out the discussion more fully. Nevertheless, "The Pharmacologist" is the only published medium in which our members may express in this manner their attitudes regarding Society affairs, and since this has been done with dignity by Dr. Domino his request was granted.

Thus, as the record stands, his point of view represents that expressed last year by about 22 per cent of the voting members. It can be anticipated that the debate on the amendment at the first business meeting in Atlantic City (4:30 p.m., Tuesday, April 11, 1961, in Borton Hall of the Dennis Hotel) should be a lively one. Be there! Participate! Vote!

Karl H. Beyer, Secretary

PROPOSED AMENDMENT TO THE CONSTITUTION, ARTICLE I. Name

The proposed revision to Article I is published below and will be submitted to the Society for action at its first business meeting to be held on Tuesday, April 11, 1961, at 4:30 p.m. in Borton Hall in the Dennis Hotel in Atlantic City at the time of the Federation Meetings.

To the Secretary of the American Society for
Pharmacology and Experimental Therapeutics, Incorporated:

We, the following members of this Society, propose the following amendment to the Constitution of this Society:

Resolved that Article I shall read as follows:

"Article I. The name of this organization is the American Society for Pharmacology, Incorporated."

Signed by: Arnold D. Welch
W. W. Douglas
Allan Bass
F. E. Shideman
George B. Koelle
Herbert L. Borison
F. Edmund Hunter

21 Jan. 1961

SOCIETY'S NAME CHANGE - PRO AND CON

Prepared by Edward F. Domino, M.D.

Although there are many reasons why individuals change their names, there are relatively few reasons for Society name changes. In the case of our Society arguments for deleting the words "Experimental Therapeutics" have been cited as:

a) The name is too long. A shorter name will save time writing checks and will conserve space with regard to letterheads, Journal, etc.

b) Redundancy. Experimental therapeutics is part of pharmacology.

c) Excessive glamorization of experimental therapeutics, inasmuch as this is only one branch of our many faceted discipline.

d) It has been said that John Jacob Abel desired it.

Society's Name Change - Pro and Con

Arguments cited for preserving the name of our Society include:

a) Space on the Journal cover, letterheads, and checks is not a problem.

b) Although experimental therapeutics is a branch of pharmacology, it is also what makes pharmacology in part uniquely different from biochemistry and physiology. It gives our discipline prestige. Therefore, glamorization of experimental therapeutics has its virtues.

c) The words "experimental therapeutics" are emotionally appealing to possible graduate students and others, and point out some of the merits and goals of pharmacology.

d) Although John Jacob Abel may have wanted a shorter name, he chose a longer one to avoid confusion with a pharmacy group which preempted the name American Society for Pharmacology (or Pharmacy?). Confusion is still possible with the symbols ASP. For example, it might be confused with APS of the psychiatrists, ASP of possible proctologists, physicists, etc. Journal confusion with the J.P. of Journal of Physiology, etc. is likely. No confusion is possible with J.P.E.T., although admittedly this is not an official abbreviation of our Journal.

e) Most dangerous of all is the possibility that by divorcing pharmacology from experimental therapeutics, one will encourage the formation of splinter groups leaving our Society and joining other societies promoting experimental therapeutics. Our Society needs and welcomes the pharmacologist who is primarily involved in experimental therapeutics, since his goals are those of many of our Society members.

In view of these and other possible arguments we, the undersigned, believe that the proposed shortening in our Society's name will do more harm than good and urge all our Society members to vote against a name change at the coming Federation meetings in Atlantic City.

/s/ Committee for the Preservation of Our Society's Name

B. E. Abreu, G. A. Alles, H. K. Beecher, C. Brooks, J. J. Burns, T. C. Butler, R. J. Cazort, G. Chen, J. Y. P. Chen, K. K. Chen, K. W. Cochran, J. H. Comroe, Jr., L. Cook, P. J. Costa, H. Cullumbine, B. DeBoer, S. J. DeSalva, J. R. DiPalma, E. F. Domino, C. A. Dragstedt, N. B. Eddy, J. J. Elkes, S. Ellis, G. M. Everett, E. J. Fellows, F. F. Foldes, H. F. Fraser, W. H. Funderburk, W. H. Gantt, E. M. K. Geiling, L. I. Goldberg, W. M. Govier, A. Grollman, C. M. Gruber, L. Gyermek, H. Isbell, H. K. Iwamoto, A. Kandel, A. C. Keyl, K. K. Kimura, W. A. Krivoy, M. Lane, L. Lasagna, A. J. Lehman, A. S. Marrazzi, E. K. Marshall, Jr., W. R. Martin, R. A. McLean, T. B. O'Dell, Y. T. Oester, A. H. Owens, Jr., E. G. Pardo, R. W. Payne, C. D. Proctor, R. K. Richards, J. L. Schmidt, L. D. Seager, J. C. Seed, R. A. Seibert, T. R. Sherrod, D. B. Taylor, J. D. Taylor, R. E. Tedeschi, J. E. P. Toman, J. H. Trapold, S. C. Wang, J. A. Wells.

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acknowledges with grateful appreciation
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ANNOUNCEMENTS OF COMING MEETINGS

Federation of American Societies for Experimental Biology:

1961: Atlantic City, N. J., April 10-14
1962: Atlantic City, N. J., April 16-20
1963: Atlantic City, N. J., April 15-19
1964: Chicago, Ill.
1965: Atlantic City, N. J.

Fall Meetings of The American Society for Pharmacology and Experimental Therapeutics, Inc.:

1961: Rochester, N. Y., August 29-September 1
1962: Nashville, Tenn. (Vanderbilt)
1963: San Francisco, Calif. (Univ. of Calif.)
1964: Little Rock, Ark. (Univ. of Arkansas)
1965: Philadelphia, Pa. (Univ. of Penna.)

American Association for the Advancement of Science - Annual Meeting:

1961: Denver, Colorado, December 26-31

American Chemical Society - National Meeting:

1961: St. Louis, Mo., March 21-30

American Medical Association - Annual Meeting:

1961: New York, N. Y., June 19-23

Third Inter-American Conference on Occupational Medicine and Toxicology:

1961: Coral Gables, Fla., August 6-10

First International Pharmacological Meeting:

1961: Stockholm, Sweden, August 22-25

XXII International Physiological Congress:

1962: Leiden, Netherlands, September 11-17

THIRD INTER-AMERICAN CONFERENCE ON OCCUPATIONAL MEDICINE AND TOXICOLOGY

On August 6 to 10, 1961, the University of Miami School of Medicine, Coral Gables, Florida, will hold its "Third Inter-American Conference on Occupation Medicine and Toxicology". While the previous conferences, in 1956 and in 1958, were conducted entirely in the Spanish Language, the 1961 meeting will be conducted in both Spanish and English. These conferences, which are listed by the University as "Post-Graduate Courses in Occupational Medicine and Toxicology," were organized largely because of the interest of Dr. Willard Machle (Research Associate Professor of Pharmacology) and Dr. William B. Deichmann (Professor and Chairman, Department of Pharmacology) in the broad field of toxicology and its application to occupational medicine.

To quote University of Miami's president, Dr. Jay F. W. Pearson, the conference is based on "the philosophy of the University of Miami to do all that it can to encourage every opportunity for free exchange of ideas and information which will serve to bring greater understanding of, and benefits to, the peoples of our Country and those of our neighboring countries."

The previous meetings were attended by delegates from practically every country to the south of the United States.

The 1961 Conference will be conducted with the cooperation of faculty members of the University of Puerto Rico as well as by members of the Industrial Medical Association of Puerto Rico. Dr. Joseph R. Vivas, Dean of the University of Puerto Rico, will serve as Co-Director General.

Headquarters for the Conference will be the "Biscayne Terrace Hotel" in downtown Miami. Papers will be accepted in the fields of

Administrative Practices
Environmental Hygiene
Ionizing and Microwave (Radar) Radiation
Noise
Dermatology
Antibiotics and other Drugs
Medicine in the Tropics
Pesticides, etc.

For further information or registration, apply to Dr. William B. Deichmann, Co-Director General of the Conference.

Travel Grants:

The Section on Pharmacology, International Union of Physiological Sciences (IUPS), will receive a grant from the National Institutes of Health, Department of Health, Education, and Welfare, for the purpose of paying travel expenses for American scientists to the First International Pharmacological Meeting in Stockholm, August 22-25, 1961. Part of the fund will be assigned for the passages of the invited American participants and of the members of the USA National Committee of IUPS. The rest of the grant will be awarded to those American scientists who have a particular interest in the general program as previously announced (The Pharmacologist, vol. 2, no. 2, p. 7, 1960).

Applications should be made in triplicate to Dr. Carl F. Schmidt, President of the Section on Pharmacology of the IUPS, Department of Pharmacology, University of Pennsylvania, School of Medicine, Philadelphia 4, Pennsylvania. Please give full name, age, address, nationality, earned degree(s), academic affiliation, membership in any biological society, field of research. Please refrain from applying if you are a holder of any government or private grant which allows travel funds. The deadline is May 1, 1961.

American Drug Manufacturers Aid Pharmacological Meeting:

Preparations for the First International Pharmacological Meeting, to be held in Stockholm on August 22-25, 1961, are now nearing the final stage. The general theme of the meeting is to be The Mode of Action of Drugs, which will be considered by invited speakers in eight symposia. Emphasis is to be placed on fundamental (cellular and subcellular) and interdisciplinary (biophysical, biochemical, physiological, pharmacological) aspects. Titles and abstracts of these should be sent before March 1 to the secretary of the meeting: Dr. Bo Holmstedt, Karolinska Institutet, Stockholm 60, Sweden. Applications for membership in the meeting can also be secured from the secretary.

The arrangements for the meeting have been greatly facilitated by generous contributions from American pharmaceutical manufacturers. A total of $8750.00 has been received from the following companies: Abbott Labs., Alcon Labs., Inc., Burroughs Wellcome & Co. (U.S.A.) Inc., Ciba, Geigy Research Labs., Lilly Research Labs., Mead Johnson & Co., Merck Sharp & Dohme Research Labs., Parke, Davis & Co., Chas. Pfizer & Co., Inc., Riker Labs., Inc., Sandoz Pharmaceuticals, Schering Corp., Smith Kline & French Labs., Squibb Institute, Sterling-Winthrop Research Inst., Wallace Labs., Warner-Lambert Research Inst., Wyeth Labs., Upjohn Co.

The American pharmaceutical industry thus is manifesting once again, and in the most helpful manner, its generosity toward the International Union of Physiological Sciences, whose Section on Pharmacology is organizing this meeting.

WESTERN PHARMACOLOGY SOCIETY

The Western Pharmacology Society held its fourth annual meeting at the Miramar Hotel in Santa Monica, California. There were 97 registrants. The membership approved nominations of 23 new members. The new president, succeeding Dr. Howard Bierman, is Dr. Gordon Alles. Dr. Norman David is President-Elect, and Dr. E. Leong Way and Dr. George Cronheim are counselors for the coming year. Dr. J. M. Dille will continue as editor of the "Proceedings of the Western Pharmacology Society."

Two successful symposia were presented on "The Pharmacology of Newer Anti-Cancer Chemotherapeutic Drugs," organized by Dr. H. R. Bierman, and "Variations in Drug Responses as an Exercise in Human Pharmacology," organized by Dr. George Cronheim. The dinner speaker was Dr. E. Leong Way, who told the group about "The Materia Medica Program in Communist China."

In addition to these special features, there were 14 presentations of research papers. It is expected that these presentations will be published in "Proceedings of the Western Pharmacology Society," which will be distributed, as in the past, without cost to members of the American Society for Pharmacology and Experimental Therapeutics, medical libraries and interested individuals.

RETIRED MEMBERS

The following members of The American Society for Pharmacology and Experimental Therapeutics have attained retired status during the past year:

G. S. Eadie
Owen S. Gibbs
Isaac Neuwirth
R. A. Waud
Eugene L. Jackson

IN SYMPATHY

The American Society for Pharmacology and Experimental Therapeutics wishes to extend its sincere sympathy to the families of the following members of the Society who died during the past year:

John A. Eyster
Worth Hale
Philip Hitchcock
Henry M. Lee
Henry W. Newman
James C. Rice
E. A. Rovenstine
Victor P. Seeberg
Paul K. Smith
Edward E. Swanson

MINUTES OF BUSINESS MEETING
AMERICAN SOCIETY FOR PHARMACOLOGY AND EXPERIMENTAL THERAPEUTICS
Health Science Building Auditorium
University of Washington
Seattle, Washington

Meeting: 4:30 P.M., Wednesday, August 24, 1960
(156 members present)

Item #1. Minutes of Chicago Business Meetings.

The minutes of the Chicago Business Meetings were approved as published in the Fall 1960 issue of "The Pharmacologist."

Item #2. Introduction of new members.

New members in attendance at the Business Meeting were introduced to the Society.

Item #3. Announcement of coming meetings.

a) Federation Meetings:
1961: Atlantic City - April 10-15
1962: Atlantic City - April 16-20
1963: Atlantic City - April 15-19
1964: Chicago - date open
1965: Atlantic City - date open

b) Society Fall Meetings:
1961: Rochester - August 28-31
1962: Nashville (Vanderbilt)
1963: San Francisco (Univ. of California)
1964: Little Rock (Univ. of Arkansas)
1965: Philadelphia (Univ. of Penna.)

Dr. Gilman announced that Dr. Efrain G. Pardo gave an informal invitation to the Society to hold its 1966 Fall Meeting at the University of Mexico, Mexico City. The reaction to this informal invitation was enthusiastic.

c) First International Pharmacological Meeting - Dr. Schmidt:

Dr. Schmidt reported on plans for the First International Pharmacological Meeting, to be held in Stockholm, August 22-25, 1961. He indicated that information pertaining to this meeting would go out to the members of the Society within the next few weeks. He also indicated that the closing dates for the payment of fees and for the making of hotel reservations would be February 1, 1961, and that the deadline for acceptance of abstracts for 10-minute papers to be presented at that meeting would be March 1, 1961. The registration fee for the meeting is to be 105 Swedish Kroner, or the approximate equivalent of $15.00; 55 Swedish Kroner for associates. Correspondence regarding the meeting should be addressed to Professor B. Uvnas or Professor A. Wretlind.

Item #3. Announcement of coming meetings (Cont'd).

d) XXII International Physiological Congress - Dr. Chen:

Dr. Chen announced the forthcoming XXII International Physiological Congress, to be held in Leiden, Netherlands, August 1962, as reported in the Fall 1960 issue of "The Pharmacologist." He solicited suggestions for symposia topics and for suitable speakers. These should be addressed to Dr. Chen and should be in his hands as soon as possible.

e) Third Inter-American Conference on Occupational Medicine and Toxicology - Dr. Deichmann:

Dr. William Deichmann presented an invitation to the Society to attend the Third Inter-American Conference on Occupational Medicine and Toxicology to be held in Coral Gables, Florida, August 6-11, 1961.

Item #4. Torald Sollmann Award in Pharmacology.

Dr. Gilman announced that the first Torald Sollmann Award in Pharmacology would be made during the 1961 Fall Meeting of the Society in Rochester. He indicated that instructions for nominations were printed in the Fall 1960 issue of "The Pharmacologist." The deadline for the receipt of nominations is January 15, 1961. The Award Committee is to be made up of members of the Society Council, with the Senior Councilor acting as Chairman thereof. A further announcement of the Sollmann Award is to be made in the fall.

Item #5. Change in the name of the Society and Society's Journal.

Dr. Gilman announced that an amendment to the Constitution, calling for a change in the name of the Society and its principal Journal, would be resubmitted at the 1961 Spring Meeting.

Item #6. Change in date for installation of Society officers.

It was announced that Council had approved the setting forth of a constitutional amendment which would change the date for the installation of Society officers to the end of the second business meeting at the Spring session. This amendment would be acted upon at the business meetings at the 1961 Spring Meeting. The purpose of such an amendment would be to permit the new officers to take over immediately after the Spring session, in order to expedite the management of the affairs of the Society particularly prior to the Fall Meeting.

Item #7. Executive Officer of the Society.

Dr. Gilman reported on the search for an Executive Officer of the Society. He indicated that the selection of such an Executive Officer would be made during the fall of 1960. Additional space at Beaumont House has been rented. Also, it was anticipated that there will be additional building at Beaumont House to provide adequate office space for the several societies of the Federation.

Item #8. Committee Reports.

a) Committee on Financial Resources and Budget - Dr. Chen:

Dr. Chen reported on the activities of the Committee on Financial Resources and Budget, indicating that the Society was solvent. He mentioned the various sources of income for the Society, including that from the Corporate Associates program. Dr. Chen indicated that we were ready to set up an office at Beaumont House and that the Society was committed for space there for an Executive Officer.

b) Committee on Educational Affairs - Dr. Unna:

Dr. Unna announced that the chairman of the Teaching Institute on "Gastrointestinal Pharmacology," to be held during the 1961 Fall Meeting in Rochester, would be Dr. C. A. M. Hogben. Suggestions were solicited from the members for future Teaching Sessions.

It was indicated that the report on the survey of Graduate Education in Pharmacology would be published in full in the Spring 1961 issue of "The Pharmacologist"; this expanded report will include all the tables. Dr. Unna expressed his appreciation to all those who participated in the survey, particularly mentioning his gratitude for the 100% return of the questionnaires.

Dr. Unna reported that the second edition of the brochure on "A Career in Pharmacology" has just been published. One hundred fifty thousand copies have been printed and are available for distribution upon request to Beaumont House. The National Science Teachers Organization will distribute 25,000 copies of the brochure.

c) Committee on Professional Affairs and Public Relations - Dr. Chenoweth:

The report on the activities of the Committee on Professional Affairs and Public Relations was presented by Dr. Chenoweth, in the absence of the Chairman, Dr. Harold C. Hodge. The following matters were discussed: 1) the University of Arkansas problem regarding affidavits of club and society memberships; 2) Loyalty Oath Provision of the National Defense Education Act; 3) the matter of drug advertising; and 4) the Cooper Bill concerning regulation of animal research. This report is published in the Spring 1961 issue of "The Pharmacologist."

d) Chairman of the Board of Publication Trustees - Dr. Krayer:

Dr. Krayer announced that a correction should be made in the Report of the Chairman of the Board of Publication Trustees, which appeared on page 37 of the Fall 1960 issue of "The Pharmacologist." The statement with regard to

Item #8. Committee Reports (Cont'd).

d) Chairman of the Board of Publication Trustees - Dr. Krayer:

the new page allowance for the Journal, appearing as the last sentence of the fourth paragraph, should be amended to read as follows:

> "In 1961, there will be four volumes of 400 double-column pages each. Reviews has increased page allowance in 1960 from 480 to 550 single-column pages. The price per volume of Journal and Reviews is $10.00."

Item #9. Abstracts for 1961 Federation Meeting.

It was announced by Dr. Beyer that the deadline for the receipt of abstracts for the 1961 Federation Meeting by the Secretary of the Society is December 15, 1960.

Item #10. Abstracts for 1961 Fall Meeting.

It was announced by Dr. P. K. Smith that the deadline for the receipt of abstracts for the 1961 Fall Meeting in Rochester is June 16, 1961.

Item #11. "Retired" Members.

It was announced that the following members had achieved "retired" status in the Society:

G. S. Eadie
Owen S. Gibbs
Isaac Neuwirth
Emery Rovenstine
R. A. Waud

Item #12. New Business.

Dr. K. K. Chen expressed for the membership of the Society a standing vote of thanks and appreciation to Dr. James M. Dille and his Local Committee for their efforts in making the Seattle meetings the success that they were.

Item #13. Adjournment.

There being no further business, it was moved and seconded that the meeting be adjourned at 5:20 P.M.

MINUTES OF COUNCIL MEETINGS
AMERICAN SOCIETY FOR PHARMACOLOGY AND EXPERIMENTAL THERAPEUTICS
Men's Residence Hall
University of Washington
Seattle, Washington

First Council Meeting: 8:00 P.M., Sunday, August 21, 1960
Present: Drs. Beyer, Dille, Featherstone (part time), Gilman, Goodman, Riker, Shideman and Unna.

Second Council Meeting: 9:00 A.M. Tuesday, August 23, 1960
Present: Drs. Beyer, Chen, Featherstone, Gilman, Goodman, Krayer, Riker, Shideman and P. K. Smith.

Item #1. Minutes of Chicago Council and Business Meetings.

The minutes of the Chicago Council and Business Meetings were approved as published in the Fall 1960 issue of "The Pharmacologist," except for a correction in the Report of the Chairman of the Board of Publication Trustees, which appeared on page 37. The statement with regard to the new page allowance for the Journal, appearing as the last sentence of the fourth paragraph, should be amended to read as follows:

> "In 1961, there will be four volumes of 400 double-column pages each. Reviews has increased page allowance in 1960 from 480 to 550 single-column pages. The price per volume of Journal and Reviews is $10.00."

Item #2. Announcements of meetings.

a) Coming Meetings:

	Spring	Fall
1961:	Atlantic City - April 10-15	Rochester - August 28-31
1962:	Atlantic City - April 16-20	Nashville (Vanderbilt)
1963:	Atlantic City - April 15-19	San Francisco (Univ. of Calif.)
1964:	Chicago	Little Rock (Univ. of Arkansas)
1965:	Atlantic City	Philadelphia (Univ. of Penna.)

b) Status of the 1960 Fall Meeting in Seattle - Dr. Dille:

Dr. Dille reported that there were some 357 pre-registrants for the Fall Meeting in Seattle and that 70 wives were registered for the meetings in advance. The final registration for the meetings was 494.

Item #2. Announcements of meetings (Cont'd).

c) 1961 Fall Meeting in Rochester:

Due to the very close timing, in August of 1961, between the end of the Stockholm meeting and the beginning of the Fall Pharmacology Meeting in Rochester, it was suggested that the Teaching Institute be held later in the week of the Rochester meeting. No action was taken on this matter. It will be referred to Council again at the Spring Federation Meeting for action.

d) 1963 Fall Meeting in San Francisco - Dr. Featherstone:

Dr. Featherstone reported on plans for the 1963 Fall Meeting in San Francisco. It was decided to hold the sessions at the Medical Center on the campus of the University of California, with arrangements for hotel accommodations in San Francisco.

e) XXII International Physiological Congress - Dr. Chen:

Dr. Chen reported on present plans for the XXII International Physiological Congress, to be held in Leiden, Netherlands, in August of 1962, emphasizing that these were as published in the Fall 1960 issue of "The Pharmacologist." He particularly solicited suggestions for topics for symposia and the names of appropriate lecturers.

f) First International Pharmacological Meeting - (see Item #13 of these minutes).

Item #3. Committee Reports.

a) Committee on Financial Resources and Budget - Dr. Chen:

Dr. Chen reported that the Committee on Financial Resources and Budget met on Sunday afternoon. He reported on the present status of the Corporate Associates program, and the plans were laid for the approach to Corporate Associate members by the President by November 1. It was pointed out that, whereas Corporate Associates constituted a tremendously important source of income to the Society, nevertheless, it was still necessary for the Society to get most of its income from journal profits and from regular membership dues.

b) Committee on Educational Affairs - Dr. Unna:

Dr. Unna reported that the new edition of the brochure on "A Career in Pharmacology" has just been published and that copies of it are being distributed through the National Science Teachers Organization. One hundred fifty thousand copies of the brochure were printed. These are available to members of the Society for distribution upon request through Beaumont House. The brochure indicates that on inquiry to Beaumont House the prospective student

Item #3. Committee Reports (Cont'd).

b) Committee on Educational Affairs - Dr. Unna:

would be given the names of the nearest Departments of Pharmacology to which he could apply, together with a further indication to what pharmacology is and some guidance as to how to go about graduate work in pharmacology, especially as that pertains to a curriculum of study.

The Council approved the arrangement whereby Dr. Allan D. Bass will function as Treasurer for the Committee on Educational Affairs.

It was indicated that the report on the survey of Graduate Education in Pharmacology would be published in full, including the tables, in the Spring 1961 issue of "The Pharmacologist." In addition, it is planned to submit the report to the "Journal of Medical Education" for publication. It was anticipated that 1000 reprints of the "Journal of Medical Education" article would be ordered and paid for out of the grant-in-aid of this survey. The reprints are for distribution to the membership of the Society.

Dr. Unna announced that Dr. C. A. M. Hogben had accepted the responsibility for the 1961 Teaching Institute in Rochester on "Gastrointestinal Pharmacology." Suggestions were also presented for the Teaching Session in 1962.

It was suggested that an application be made for the renewal of the National Institutes of Health grant in support of the activities of the Educational Affairs Committee. This was approved by the Council.

c) Committee on Professional Affairs and Public Relations - Dr. Chenoweth:

Dr. Chenoweth presented a report for Dr. Harold C. Hodge, Chairman of the Committee on Professional Affairs and Public Relations. This report was approved by Council and is published in the Spring 1961 issue of "The Pharmacologist."

d) Subcommittee on "Handbook on Pharmacological Actions" - Dr. Smith:

Dr. P. K. Smith reported for the Subcommittee on "Handbook on Pharmacological Actions." This subcommittee, composed of Drs. P. K. Smith, C. Jelleff Carr, John C. Krantz and Karl H. Beyer, met with Dr. Milton O. Lee and Mr. Phil Altman, Director of the Handbook Office, at Beaumont House on August 2, 1960 and reviewed the material available for such a publication. They recommended that no action be taken toward the publication of the "Handbook." The material available was both incomplete and inappropriate for such a publication.

The Council approved the recommendation of the Subcommittee, which was then dissolved.

Item #4. Meeting of Advisory Committee of the Federation Board.

Copies of the minutes of the meeting of the Advisory Committee of the Federation Board, held at Beaumont House on May 15, 1960, had been distributed to each member of Council, and no discussion was necessary.

Item #5. Change in name of Society and Society's Journal - Dr. Goodman.

Dr. Goodman reiterated his impression gained from Dr. Sollmann that Dr. Abel had intended that our Society be called the American Society for Pharmacology, but that that title had been preempted by a pharmacy group, so that it was considered necessary to add the descriptive term from which the Society derived its name of "American Society for Pharmacology and Experimental Therapeutics." It was recommended that a group be appointed to re-draft a constitutional amendment pertaining to the change in name of the Society. The President of the Society, Dr. Gilman, was instructed to make such an appointment.

Item #6. Change in date for installation of Society officers - Dr. Goodman.

Dr. Goodman pointed out the advantage of changing the date for the installation of officers to the end of the second business meeting during the Spring Meeting of the Society. It was pointed out that this would permit the new officers to take charge immediately, so that they might carry through the full plans for the Fall Session, rather than having to assume the arrangements for those meetingsdeveloped prior to July 1 by the previous officers. The suggestion was approved in principle by Council, and Dr. Goodman was instructed to draw up a constitutional amendment to be presented to the membership at the 1961 Spring Meeting.

Item #7. Executive Officer.

Dr. Gilman reported on the activities of the Search Committee, whose responsibility was the selection of a suitable Executive Officer for the Society. The qualifications of several individuals were discussed, and it was decided to interview those applicants present at the Seattle meetings during the course of the meeting.

In addition, Dr. Gilman reported on the procurement of space for the Executive Officer at Beaumont House. These arrangements have been made with Mr. Robert Harvey, Business Manager for the Federation. Thus, suitable office space has been set aside for the new Executive Officer and his staff.

Item #8. Society representation on Division of Chemistry and Chemical Technology, National Academy of Sciences - National Research Council.

The appointment of Dr. John J. Burns as Society representative on the Division of Chemistry and Chemical Technology, National Academy of Sciences, National Research Council for a 3-year term was confirmed by Council.

Item #9. Charge for retyping of abstracts.

It was pointed out that the present charge for the retyping of abstracts for the Fall Meeting was inadequate to cover the over-all costs of retyping and billing the individual for the charge. Council approved the setting up of a fee for the retyping of abstracts for all meetings of the Society of $10, with the instruction that the charge be enforced.

Item #10. Deadline for abstracts.

The Council approved the setting of the deadline for the receipt of abstracts for the 1961 Spring Federation Meeting at December 15, 1960. This action was taken by the secretaries of the several societies at their meeting in January.

Item #11. Torald Sollmann Award in Pharmacology - Dr. Gilman.

It was decided that "the Sollmann Award Committee shall be the Council members and the Chairman shall be the Senior Councilor." The date of January 15 was set as the deadline for nominations for the award. It was requested that an announcement soliciting nominations be indicated in the fall mailing to the Society and that it be put in the Society journals immediately. The first Sollmann Award is scheduled to be given at the 1961 Fall Meeting of the Society in Rochester.

Item #12. "Retired" Members.

Council approved "Retired" status for the following individuals:

G. S. Eadie
Owen S. Gibbs
Isaac Neuwirth
Emery Rovenstine
R. A. Waud

Item #13. First International Pharmacological Meeting - Dr. Schmidt.

Dr. Schmidt presented a status report on plans for the First International Pharmacological Meeting, to be held in Stockholm, August 22-25, 1961. He indicated that an additional symposium pertaining to the "Pharmacologic Action of Central Nervous System Agents" had been added, bringing the list of symposia to 8. He also indicated that announcements for the meetings would be sent out during the fall.

The National Institutes of Health had approved a grant in support of the meeting and, in addition, several American and European pharmaceutical houses had contributed toward its financing.

Alternative suggestions for the publication of the symposia were discussed, and it was decided to recommend to Professor Uvnas that he negotiate for the publication thereof by a commercial publisher.

Item #14. Proposed coding system for Federation abstracts - Dr. Schueler.

Dr. Schueler presented a proposed coding system for Federation abstracts. Dr. Schueler's proposal was sufficiently comprehensive as to be useful for the programming of abstracts across the lines of interest of the several societies. This proposal has been forwarded to Dr. Milton O. Lee, Executive Officer for the Federation, who has expressed a very real interest in it. It was agreed that Dr. Schueler's ideas should be made available to the Federation secretaries generally, although it was not anticipated that this could be done in such a manner as to prove useful for programming the 1961 Federation Meeting.

Item #15. "Cooper Bill."

The "Cooper Bill," dealing with the federal regulation of animal welfare and the reporting of experimental design on research supported by federal grants, was discussed as a part of the report by Dr. Chenoweth for the Committee on Professional Affairs and Public Relations.

Item #16. Membership applications - Drs. Koelle, Wescoe and Furchgott.

Drs. Koelle, Wescoe and Furchgott (Membership Committee) discussed the applications for membership in the Society with Council. The question arose as to whether it was the intent of the constitution that a) an applicant to the Society be a citizen of this country, or b) one resident in this country over a period of years without the rights of citizenship should be eligible for membership. The constitution pertaining to this matter reads as follows:

BY-LAWS

I. Members

1. Except as hereinafter provided, after 1958 only persons having legal residence in the United States, its dependencies, Canada, and Mexico shall be eligible for election as members of the Society.

2. In special cases, candidates for membership from areas other than those described in By-Law I.1. may be proposed by the Membership Committee or by the Council. These candidates must be unanimously approved by the Council and the Membership Committee; their election by the Society shall follow the rules prescribed for members.

Item #17. Additional Business.

It has been brought to the attention of Council that some of the members of the Society felt that the Pharmacology Society should make available its counsel on the appointment of new heads of Departments of Pharmacology to the Deans of medical schools or to their Search Committees. Dr. Riker offered to

Item #17. Additional Business (Cont'd).

draft such a letter as might be forwarded by the Secretary of the Society to the deans of such medical schools, offering aid or consultation. Dr. Shideman made a motion that such an action be taken; the motion was seconded by Dr. Featherstone and approved by Council.

Report of Committee on Professional Affairs and Public Relations

The Committee was unable to assemble, and so conducted some business by mail. Four points on the agenda drawn up by Dr. Hodge were considered:

1. University of Arkansas problem re affidavits of club and society memberships. (This matter appears to have been settled in a manner agreeable enough to the principals to warrant no further immediate action by our Society.)

2. Loyalty Oath Provision of the National Defense Education Act.

3. The matter of drug advertising.

Points 2 and 3 require further consideration of the best possible way to make the influence of the Society felt.

Point 2:
It is probable that the present Congress will not pass a bill containing very offensive requirements attached to the Act. It is recognized on the floor of Congress that this has been a fatuous and distasteful imposition on the impoverished pupil.

At the annual meeting in the Spring 1959, the American Society of Biological Chemists resolved to "reaffirm its resolution of last year condemning the Loyalty Oath Affidavit of the National Defense Education Act, and, in addition, to instruct the Secretary to inform the other societies of the Federation of our deliberations and instruct the general press and the editors of Science, Scientific American and The American Scientist of this resolution."

A similar resolution by our Society might well be in order at the annual meeting, if the situation is unchanged at that time.

Point 3:
The Council on Drugs of the American Medical Association is conducting a vigorous investigation of ethical drug advertising. The August 6 issue of J.A.M.A. carried a statement of the A.M.A. Principles Governing Advertising in A.M.A. Publications, and our Society has offered a representative from this Committee to assist this program.

Further study of practical and effective ways in which to make our special strength felt will be in order. Well thought out suggestions could be helpful.

4. The Cooper Bill concerning regulation of animal research.

It may be assumed that we are all opposed to this Bill. It has not seemed of much use to so resolve, as we may be accused of "vested interest." Open hearings on the Bill should be encouraged, as these have been found to be especially successful in local situations. The Department of Health, Education and Welfare is actively opposing the Bill. It is recommended that individuals write their own congressmen, opposing the Bill and urging positive proposals such as funds for studying animal colony care, attracting veterinarians into such work, creating well-designed colony space in poorer institutions, and so forth.

No official Society action is as yet recommended.

Respectfully,

/s/

M. B. Chenoweth,
Acting Chairman

TEACHING INSTITUTE

Monday, August 22, 1960
University of Washington
Seattle, Washington

"Neuropharmacology"

Chairman: Dr. K. R. Unna

Department of Pharmacology
University of Illinois
Chicago, Illinois

J. E. P. Toman Chicago Medical School Discussant: A. M. Shanes National Institutes of Health	Neuropharmacology of the Conduction Process
D. M. Woodbury University of Utah Discussant: J. G. Millichap Mayo Clinic	Neuropharmacology of Seizures
C. M. Smith University of Illinois Discussant: D. W. Esplin University of Utah	Drug Effects on Autogenetic Control of Skeletal Muscle
Eva K. Killam Stanford University Discussant: Arthur A. Ward, Jr. University of Washington	Modulation of Sensory and Motor Systems
G. L. Gerstein and W. A. Rosenblith Mass. Inst. of Technology Discussant: K. R. Killam Stanford University	The Processing of Neuroelectric Data; Average Responses and Firing Patterns of Single Neurons
L. S. Goodman University of Utah	Summary

Pharmacology of the Conduction Process

James E. P. Toman
Chicago Medical School

Such paradoxes as the central convulsant actions of local anesthetics and the relative lack of axonal effects of some autonomic mediators have tended to cast doubt on the validity of any translation of drug data from nerve fibers to other sites. Nevertheless the hope persists that with increasing knowledge and methodology it will be possible to identify common mechanisms of action in many instances where the ultimate manifestations of a drug effect appear superficially to be qualitatively different at different neuronal sites. In this optimistic spirit it will be pertinent to review the present status of concepts and measurements in peripheral axonal neuropharmacology. At present the most successful unifying concept for organizing a multitude of phenomena in normal and drug-treated neurones is the sodium-potassium diffusion potential theory. Many of the classical measurable variables or their derived terms (resting potential, action potential, after-potentials, threshold, factor of safety, accommodation, strength-duration curve, etc.) can be rigorously and quantitatively derived from consideration of the internal and external concentrations of sodium and potassium (secondarily, chloride and calcium), the specific membrane permeabilities to these ions, and the time course of change of these permeabilities in relation to changes in the membrane voltage. A graphic schematization of these relations, useful for student teaching, will be presented.

Despite these unifying principles, some large remaining problems are (1) the physicochemical nature of the empirical curve of dependence of ion permeabilities on membrane voltage, and (2) the nature of the metabolic processes for separation of ions against a diffusion gradient. In these respects present knowledge is more descriptive and empirical than explanatory. The hidden variables concealed in these processes may well be sites of possible drug action, giving us more alternative classes of drug action types than are presently conceivable from the sodium-potassium hypothesis alone. Some illustrative examples of drug action classes will be discussed.

Finally, it is emphasized that principles derived from peripheral neurophsiology must be taken into account in problems of central or other synaptic transmission, even though many synaptically active substances have not yet been demonstrated to show relevant changes in peripheral axones. The postulation of a new specific synaptic mediator is intellectually unsatisfying without some knowledge of how it mediates.

Some Aspects of Peripheral Neuropharmacology

Abraham M. Shanes
National Institute of Arthritis and Metabolic Diseases

Studies of (a) depolarization of nerve during metabolic inhibition, (b) the acceleration of this depolarization by labilizers (e.g., veratrine or related purified alkaloids), and (c) its deceleration by stabilizers (e.g., local anesthetics) led some time ago to the proposal that these drugs act upon the "passive" permeability of the fibers to ions. This has since been amply confirmed by research on three related electrochemical parameters of the fibers: membrane potential, membrane resistance, and the ionic fluxes. These measurements have shown that stabilizers decrease the permeability to ions, whereas labilizers have the opposite effect.

Careful investigation of the same parameters during the nerve impulse has revealed, in addition, that somewhat lower concentrations of the same drugs exert their effects more directly on the increase and decrease of ion permeabilities that produce the action potential.

Important clues have now been obtained as to the mechanisms whereby stabilizers lower permeability or interfere with an increase in permeability and whereby labilizers increase permeability or delay the decrease in sodium permeability following excitation. These clues have been provided by research on monomolecular films of lipoidal molecules. Thus, it has been shown, on the one hand, that stabilizers interact with the films (due to forces related to "lipid solubility") so as to increase the packing of molecules - an effect reflected by an increase in "surface pressure" as measured with a Langmuir film balance. Labilizers, on the other hand, reduce the surface pressure when the film molecules are tightly packed, apparently by withdrawing the lipid molecules from the interface - an effect antagonized by stabilizers and other agents that antagonize the labilizers in living systems. These phenomena occur at pharmacological concentrations, which adds to the likelihood that they are related to the action of the drugs in excitable cells.

For reasons that cannot be given in detail here, one is led to the view that stabilizers interact with molecules surrounding the sites of ion entry in the resting and excised membrane. Lower concentrations may not raise the surface pressure sufficiently to interfere with the permeability to ions in the resting cell, but could well interfere with an increase in permeability, such as may occur by separation of molecules surrounding the sites of ion passage. The increase in permeability to ions induced by labilizers is readily interpreted as the consequence of the removal of one or more lipid molecules that surround the sites of ion passage. The effects of smaller labilizer concentrations in delaying the return of low permeability to sodium after excitation can be visualized as follows: During excitation the separation of the molecules around the sites of ion passage increases the packing and surface pressure of the molecules between the ionic channels, thereby enhancing the

effectiveness of the labilizers in withdrawing the interchannel molecules. As a result, the surface pressure is incompletely restored when excitation is over; however, intracellular reserves of surface-active lipid eventually provide additional molecules to restore the initial surface pressure of rest.

The studies with monomolecular films are useful not only for the help they provide in visualizing the processes occurring in living membranes, but, more important, for the new experiments they suggest for testing the concepts to which they have led.

Neuropharmacology of Seizures

Dixon M. Woodbury
University of Utah

John Hughlings Jackson pointed out that convulsions result from an "occasional sudden, excessive, rapid and local discharge of gray matter," and originate from lesions or irritation of portions of the brain. Since his time, the anatomical substratum and the properties of seizures in man and animals have been more clearly defined. Seizures represent abnormal and excessive brain discharge which may or may not be accompanied by unconsciousness, motor movement, and sensory, visceral or psychical phenomena.

Experimental seizures may be evoked by electrical, chemical, sensory, hyperthermic, etc. stimulation of the CNS. As far as the manifold overt motor manifestations of experimentally induced seizures are concerned, the common forms are the clonic and the tonic discharges. The tonic component consists of two parts, flexion and extension. Threshold seizures, however evoked, are characterized by localized clonic movements. Maximal seizures, however evoked, are characterized by tonic flexion and extension and terminal clonus. Increasing the stimulus intensity alters motor activity in the following sequence: hyperkinesia, stun (catatonia), clonus, flexion followed by clonus, and flexion followed by extension. The development of the seizure pattern in young animals in response to maximal electrical or chemical stimulation follows the same pattern as that described above for adult animals subjected to graded increases in the stimulus intensity. In spinal animals, nearly all these seizure types can be elicited by varying the stimulus parameters; indeed, the spinal cord is capable of intense self-sustained activity which does not appear to be qualitatively different from that of supraspinal structures. Thus, the reflex functions of the spinal cord appear to be of paramount importance in integrating the cerebral discharge to produce the characteristic motor seizure pattern.

Assays of anticonvulsant drugs in experimental animals are commonly based on the ability of the drug either to raise the threshold for minimal clonic seizures or to abolish the tonic extensor component of maximal seizures.

Many physiological factors alter the susceptibility of animals to seizures. Some of the factors which have been shown to increase seizure susceptibility are age, Na^+ depletion, hydration, certain endocrine imbalances, hypothermia,

hypoxia, hypocarbia, starvation and vitamin deficiencies. Some of the factors which have been demonstrated to decrease seizure susceptibility include age, hypercarbia, Na^+ excess, certain endocrine imbalances and hyperoxia. To illustrate but one of these factors, whenever simultaneous determinations have been made, it has been found that changes in brain excitability are directly proportional to changes in brain cell Na^+ concentration.

Anticonvulsant drugs or procedures may elevate seizure threshold either by raising the threshold of the constituent neurons (e.g., by stabilization of the neuronal membrane), or by decreasing the tendency to self-sustained discharge. In addition, pattern and duration of the maximal seizure may be altered by affecting the degree of spread of discharge as well as by the two mechanisms concerned in elevation of seizure threshold. Anticonvulsants also have effects on spinal cord synaptic activity which correlate with their effects on seizure threshold and on maximal seizure pattern in intact animals. For example, diphenylhydantoin is uniquely effective in abolishing the tonic phase of the maximal seizure, primarily by reducing spread of seizure discharge; it probably does this by decreasing post-tetanic potentiation (PTP), as can readily be demonstrated in the spinal cord. But one cannot generalize from this example, since acetazolamide (and CO_2), which is similarly effective in abolishing the tonic phase of the maximal seizure, has no effect on PTP; however, it does exert a depressant action which, in the spinal cord at least, is highly selective for the monosynaptic pathways. Since this is the only significant effect of acetazolamide on spinal cord synaptic transmission, it is suggested that this depressant effect is concerned with its anticonvulsant action. Trimethadione appears to elevate seizure threshold by reducing transmission during repetitive discharge, as can readily be demonstrated in spinal cord preparations. It is probable that these three mechanisms, alone or in combination, also underlie the actions of other clinically effective anticonvulsants.

Diphenylhydantoin and acetazolamide, which differ in their effects on synaptic transmission, also differ in their neurochemical effects. Although both drugs markedly decrease brain intracellular Na^+ concentration, diphenylhydantoin increases, whereas acetazolamide decreases, the uptake of radiosodium by brain cells. Acetazolamide also increases intracellular K^+ concentration, whereas diphenylhydantoin has no effect. Carbon dioxide produces the same effect as does acetazolamide on brain cell Na^+ and K^+. These observations indicate that diphenylhydantoin enhances active Na^+ transport by brain cells, whereas acetazolamide decreases the rate of influx of Na^+, i.e., decreases the permeability of the brain cell to Na^+. (CO_2 also appears to decrease permeability to Na^+.) Acetazolamide and sulfanilamide are carbonic anhydrase inhibitors, and it has been demonstrated that there is a direct correlation between the anticonvulsant potency of these two drugs and the degree to which they inhibit brain carbonic anhydrase. In addition, acetazolamide increases the total CO_2 content of brain both <u>in vivo</u> and <u>in vitro</u>. This and other evidence which shows that acetazolamide and CO_2 have the same effects on the brain under a variety of conditions indicate that carbonic anhydrase inhibitors act to suppress spread of seizure discharge by reducing brain cell permeability to Na^+ as a result of CO_2 accumulation. Diphenylhydantoin, on the other hand,

probably reduces PTP and prevents spread of seizure activity by enhancement of active Na^+ transport. This anticonvulsant appears to have marked effects on the glutamic acid-glutamine system in brain; since this system has been implicated in electrolyte transport in brain, such effects may underlie the enhancement of active Na^+ transport by diphenylhydantoin.

Neuropharmacologic Aspects of Seizures

J. Gordon Millichap
Mayo Clinic

In many instances the causation of seizure disorders is undetermined; in others, a structural lesion of the brain is contributory and is inaccessible to surgical removal. In such a case, medical treatment is largely empirical. The choice of drug is based principally on the type of the seizure pattern.

The development of new anticonvulsant compounds is facilitated by laboratory assay technics. Seizure patterns which resemble those encountered clinically may be induced in animals by a variety of methods. The type of seizure produced is dependent on the strength of the stimulus and the facility of spread of the seizure discharge. The effect of conventional anticonvulsants is related to the pattern of the seizure and not to the method of induction of the seizure. Minor, clonic and localized seizures which resemble clinical petit mal, psychomotor and focal clonic convulsions may be induced experimentally by means of electroshock stimuli of low intensity or by injections of pentylenetetrazol; both the clinical and the experimental seizures respond to trimethadione, primidone or barbiturates. Major and generalized tonic seizures which resemble clinical grand mal require electroshock stimuli of high intensity for their induction, and they respond to diphenylhydantoin. Diphenylhydantoin exacerbates petit mal and is ineffective against experimental clonic seizures induced by pentylenetetrazol.

The present methods of laboratory assay are of value in the prediction of activity of new drugs against seizure patterns of undetermined origin. In seizures associated with known precipitating factors, conventional drug therapies which have been introduced without regard to the causation of the seizure have been found relatively ineffective. Febrile convulsions in children and experimental seizures induced by hyperthermia in animals are unresponsive to diphenylhydantoin and are poorly controlled by phenobarbital in nonsedative doses; a drug with both antipyretic and anticonvulsant properties is essential for the prevention of such attacks. Hyponatremia and water intoxication are frequent complications of meningitis, and the correction or prevention of the electrolyte imbalance is necessary for the successful control of seizures associated with this and other infections. The role of fever and water and electrolyte metabolism in the mechanism of seizures has been investigated by laboratory and clinical methods. As a result of these studies of etiologic factors in convulsive disorders, rational and more specific methods of treatment have been introduced.

The Effects of Drugs on the Autogenetic Control of Skeletal Muscle Function

Cedric M. Smith
University of Illinois

The purpose of this presentation is to review and discuss the effects of agents producing muscle relaxation on the peripheral components of the myotatic reflex arcs with respect to the function of these components.

A. Sense Organs in Muscle:

1. Muscle Spindles -- a) Primary and secondary afferent endings. These are excited by acetylcholine, succinylcholine and decamethonium as the result of the stretch induced by shortening of the intrafusal fibers; this excitation is associated with depression of the monosynaptic reflex.

b) Efferent regulation of the tone of intrafusal muscle fibers via fusimotor ("small motor," "gamma-efferent") fibers; changes in intrafusal fiber length modulate the sensitivity of the primary and secondary endings to muscle stretch. Systemic administration of chlorpromazine, mephenesin, central nervous system depressants and selective application of procaine to the motor nerve can produce a decrease or abolition of tonic fusimotor neuron discharges and thus reflexly inhibit phasic and tonic stretch reflexes without producing muscle paralysis. The differential sensitivity of the extra- and intrafusal muscle fibers to tubocurarine-like compounds will be discussed.

2. Tendon Organs -- Excitation leads to autogenetic inhibition and facilitation of antagonists. No agents have been found which markedly alter the responses of tendon organs.

3. Afferent endings of Group III myelinated fibers and unmyelinated fibers: discussion of possible reflex effects.

B. Patterns of efferent activation of muscle. Characterization of the reflex responses of "tonic" and "phasic" motoneurons and their differential sensitivity to depressants.

C. Correlation of the behavior of the afferent and efferent organs in response to muscle stretch and in the initiation of muscle contraction.

D. Characterization of the pathological states of rigidity, spasticity, and tremor with respect to muscle control systems and the effects of drugs thereon.

Pharmacological Aspects of the Reflex Control of Motor Activity

Don W. Esplin
University of Utah

The presentation by Dr. Smith has clearly summarized our knowledge of the peripheral pathways concerned with the reflex control of motor activity. When the relevant connections at the cord level are included in this scheme, the functional complexity of the system is considerably increased. Dr. Smith has indicated certain means by which drugs may affect motor function, and central synapses add many more possible sites of drug action. Pharmacological studies have contributed much to our understanding of this system and will be crucially important in elucidating mechanisms which are presently obscure.

While this system is relatively complex, it is more fully understood than any other set of central reflexes. Since drug action must be explained in terms of the function of the physiological substrate, a firm groundwork has now been laid for fruitful investigation of drugs which affect motor activity at peripheral and segmental sites.

A distinctly different point of view deserves consideration. Neurons and neuronal systems are frequently employed as models with which to study drug action. Unfortunately, the models must be selected to represent more complex systems whose functions are poorly understood. The reflex systems controlling motor activity contain many subunits-- central as well as peripheral-- which may be employed to study neuropharmacological agents of all classes. Certain criteria governing the selection of models and some means of assessing their utility will be discussed.

Apart from these considerations, the reflex system described may be considered as a functional entity which serves finally to integrate all motor events. The motor acts associated with convulsive activity, to mention one example, must depend upon this system as well as upon the character of the cerebral discharge. Due attention must therefore be given to this system in considering the determinants of motor behavior and the loci of actions of drugs which affect this behavior.

Modulation of Sensory and Motor Systems

Eva King Killam
Stanford University

Early studies of drug action on specific sensory and motor systems within the brain and spinal cord were based on over-simplified concepts of the organization of the central nervous system. It was thought that stimuli received at end organs traveled virtually unaltered over simple relays to the cortex. Integration was considered to occur at the highest brain centers and motor

outflow was thought to pass over another simple conducting system to effector muscles. The development of new concepts of functional interrelations within the nervous system and of new experimental techniques will be discussed along with new ways of examining drug action from which valuable pharmacological data have begun to be accumulated.

Modulation of motor outflow occurs at all levels of the central nervous system. Intercalated relays in the reticular formation and reticulo-spinal tracts appear to be the descending pathways of extrapyramidal motor systems which regulate movement. Facilitatory and inhibitory influences from the brain stem as well as from various spinal levels alter motor responses at all levels and are considered to be the mechanisms through which central motor relaxants exert their effects on a wide range of motor performance.

Classical ascending sensory pathways have even more recently been shown to be paralleled within the brain by diffuse ascending pathways involving the reticular formation, diffuse thalamic projection system and possibly other ascending connections as well. Impulses traveling in these pathways are capable of altering the state of alertness of the cortical receiving areas and thus conscious perception of incoming stimuli. Anesthetic agents represent a class of compounds showing selective depressant effects on such pathways. The malleability of the central nervous system has been shown to be demonstrable even in the ascending relays of classical afferent systems. Brain stem reticular influences may inhibit sensory transmission at all levels including the first central relay in each of the major afferent pathways. This reticular inhibition may also be the mechanism by which irrelevant information is "filtered out" during attention. Promising studies of chlorpromazine have suggested that at least one mechanism of "tranquillization" may involve enhanced activity in systems modifying sensory input.

The Processing of Neuroelectric Data: Average Responses and Firing Patterns of Single Neurons

G. L. Gerstein and W. A. Rosenblith
Massachusetts Institute of Technology

Just as the microscope and the oscilloscope serve to extend the observable beyond the limitations of the senses, so can mathematical procedures and computers for processing aid our understanding of neurophysiological data. A variety of computational methods is available: the selection of a particular method is governed by the type of neurophysiological signal, by the experimenter's choice of dependent and independent variables, and, most important, by the problem it is hoped to solve. Certain data processing techniques which are in use at our laboratory for the quantification of neuroelectric signals will be discussed with the objective of demonstrating both their utility and limitations.

(1) The process of averaging a neuroelectric signal with respect to certain known instants of time will be described. This technique is particularly applicable, in the presence of "spontaneous" electrical activity, to the detection of responses evoked by sensory stimuli. Averaging can be useful for quantitative assessment of the effects of pharmacological agents on the nervous system.

(2) The technique of auto and cross correlation analysis will be described, and the conclusions which may be drawn from a correlogram will be examined. Applications of correlation to the analysis of EEG include clinical studies of the effects of certain drugs, as well as the diagnosis of lesions.

(3) Several computer methods for the analysis of single neuron firing patterns have been developed. These are potentially useful for quantitative evaluation of neuropharmacological experiments. When these methods are combined with averaging techniques, it is possible to begin to examine the relations between action potentials and the slow graded electrical activity.

(4) A more advanced application of computers to analysis of EEG is "the event picker." One working example detects alpha-bursts in an EEG record using criteria similar to those of a human observer. Such techniques are particularly effective in studying the "state" of the subject, and in finding the relations between behavioral and EEG data.

These are but a few of the possible computational methods which can be used in neurophysiology. Future developments will depend on the types of problems that must be examined by quantitative criteria.

Contributions of Data Processing Techniques to an Understanding of Brain Electrical Activity

Keith F. Killam
Stanford University

The paper presented by Drs. Gerstein and Rosenblith has given us a glimpse at the frontiers of experimental physiology which is usually reserved for the initiated few. Rather than discuss methodology, I would like to bring to mind concepts which make imperative the use of techniques such as those described by Dr. Gerstein.

With the development of drugs which alter behavior, attention has been directed to the inadequacies of the models and theoretical constructs of the central nervous system now used to explain the mechanism of action of these drugs. It might be said that the development of new tools -- the psychotropic drugs -- has led to the asking of questions possibly unanswerable by current concepts of the organization of the brain. How does one translate the effects of psychotropic drugs on mechanisms intrinsic to the maintenance of arousal into explanations for their effects on more complex behaviors? As a corollary,

it would appear important to investigate how both short and long term events are stored and serve as referants for the genesis of ongoing as well as new behavioral patterns. Further, the ability of the organism to discern relevant signals admixed in a morass of external and internal noise must be characterized more specifically than by operational descriptions. Certainly the most central problem to such studies is the characterization of the plasticity of responsiveness of the CNS; that is, its variability or responsiveness under as many experimental conditions as can be generated by the experimenter. It would appear to be feasible to begin to implement such studies with the techniques described by Drs. Gerstein and Rosenblith.

DR. R. KEITH CANNAN: AFTER-DINNER SPEAKER AT THE SPRING 1961 PHARMACOLOGY SOCIETY DINNER

Your President, Dr. Gilman, undertook as one of his first duties in office the selection of the Speaker at the principal meeting where the members of the Society and their guests put aside their many differences that make a vibrant organization and enjoy a pleasant evening together -- the Pharmacology Society Dinner at the Spring Meeting (Wednesday, April 12, 1961).

On one thing we can all agree. Dr. Gilman's choice of Dr. R. Keith Cannan as the after-dinner speaker is apt to draw a record attendance, for there is none of us who could not profit by his counsel. The rare individual who is not familiar with Dr. Cannan's impressive contributions to science is referred to any of the bibliographical compendia. He has been Chairman of the Division of Medical Sciences, The National Research Council, since 1953. Dr. Cannan has elected to talk on the basic subject of "Projects and Projections." What could be more inclusive of our many interests?

Perhaps it is not too early for your (outgoing!) Secretary to remind you that there will be no sale of Dinner Tickets at the door to the dining room. Tickets for the dinner will be on sale in the registration area, Lobby, Convention Hall, until 5 p.m. on Tuesday, April 11, after which time none will be available. We hope in this manner to assure you prompt and agreeable service at the dinner. It worked last year! Remember? Cocktails will be available to you and your guests (on your own expense account) outside the dining room from 6:30 p.m. until dinner. Dinner will be served at 7:00 p.m. in the Dennis Hotel.

SCHEDULE OF SESSIONS

Federation Meetings, Atlantic City, April 10-14, 1961

		Monday	Tuesday	Wednesday	Thursday	Friday
MORNING - 9 a.m.	Convention Hall Room A	Neuroph. I -- Booker	Neuroph. IV -- Berger	Neuroph. VI -- Chenoweth	Neuroph. VIII -- Seevers	Neuroph. X -- Shanes
	Dennis Hotel Borton Hall	Cardiovasc. I -- Hutcheon	Cardiovasc. III -- Cattell	Cardiovasc. V -- Krayer	Autonomics II -- Koelle	Autonomics IV -- Melville
	Dennis Hotel Crystal Ballroom	Cancer -- Welch	Anesthetics -- Boyd	Analgesics II -- Isbell	Renal II -- Farah	Blood -- Richards
	Dennis Hotel Garden Lounge	Cell. & Bio. I -- Bain	Drug Metab. I -- Larson	Drug Metab. III -- Lowry	Chemotherapy -- Modell	Gastrointestinal -- Walton
	Dennis Hotel St. Dennis Room	Neuroph. II -- Lasagna	Hemicholinium Symposium	Toxicology II -- Maynard	Radiation -- Lubin	Lipids -- Maling
AFTERNOON - 1:30 p.m.	Convention Hall Room A	Neuropharm. Symposium	Neuroph. V -- Winter	Neuroph. VII -- Carr	Neuroph. IX -- Dearborn	Neuroph. XI -- Abreu
	Dennis Hotel Borton Hall	Cardiovasc. II -- Robb	Cardiovasc. IV -- Kahn	Autonomics I -- Schueler	Autonomics III -- Winder	---
	Dennis Hotel Crystal Ballroom	Nerve-Muscle -- Taylor	Analgesics I -- David	Renal I -- Maren	---	---
	Dennis Hotel Garden Lounge	Cell. & Bio. II -- DuBois	Drug Metab. II -- Roth	Drug Metab. IV -- Brodie	Hist.-Antihist. -- Beckman	---
	Dennis Hotel St. Dennis Room	Neuroph. III -- Randall	Toxicology I -- Coon	---	Toxicology III -- Gosselin	---
			Business Mtg. Borton Hall -- 4:30 p.m.	Society Dinner Dennis Hotel -- 7:00 p.m.	Business Mtg. Borton Hall -- 4:30 p.m.	

PHARMACOLOGY SYMPOSIA PROGRAMS
Federation Meetings, Atlantic City, April 10-14, 1961

Symposium: Effects of Hallucinogenic Drugs in Man

Monday, April 10, 1961 -- Convention Hall, Room A

Chairman: Harold E. Himwich

1:30 p.m. Introductory remarks. Harold E. Himwich. Galesburg State Research Hosp.

1:35 p.m. Effects of LSD-25 and JB-318 on tests of visual and perceptual functions in man. Adrian M. Ostfeld. Univ. of Illinois.

2:05 p.m. Discussion. William T. Lhamon. Baylor Univ.

2:25 p.m. Discussion from the floor.

2:40 p.m. Hallucinogenic effects and metabolism of tryptamine derivatives in man. Stephen I. Szara. St. Elizabeths Hosp., Washington, D. C.

3:00 p.m. Correlations between behavior and the urinary excretion of indole amines and catechol amines in schizophrenic patients as affected by drugs. Guenter Brune and Gordon Pscheidt. Galesburg State Research Hosp.

3:20 p.m. Possible relations of central amines to behavior in schizophrenic patients. Seymour S. Kety. Natl. Inst. of Mental Health.

3:40 p.m. Discussion. Nicholas J. Giarman. Yale Univ.

4:10 p.m. Discussion from the floor.

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Symposium: The Hemicholiniums

Tuesday, April 11, 1961 -- Dennis Hotel, St. Dennis Room

Chairman: Fred W. Schueler

9:00 a.m. Introduction. Fred W. Schueler. Tulane Univ.

9:10 a.m. Effect of HC-3 on acetylcholine turnover. F. C. MacIntosh. McGill Univ.

Symposium: The Hemicholiniums

9:30 a.m. 5-Minute Question Period.

9:35 a.m. Post synaptic action of HC-3 on neuromuscular transmission. V. B. Brooks and R. Thies. Rockefeller Inst.

9:55 a.m. Post synaptic action of HC-3 on neuromuscular transmission. A. R. Martin and R. K. Orkand. Univ. of Utah.

10:15 a.m. 15-Minute Question Period.

10:30 a.m. Intermission.

10:40 a.m. Peripheral action of HC-3 and structure activity relationships. J. P. Long. State Univ. of Iowa.

11:00 a.m. Pharmacologic studies on 3,6-bis(3-diethylaminopropoxy)-pyridoxine-bis-methiodide, a hemicholinium-like agent. R. M. Gesler. Baxter Labs. Inc.

11:20 a.m. 5-Minute Question Period.

11:25 a.m. Respiratory depressant effect of HC-3. H. L. Borison. Univ. of Utah.

11:55 a.m. Summary and Final Question Period.

1961 FALL MEETING - ROCHESTER

The 1961 Fall Meeting of the Society will be held on the campus of the University of Rochester from August 29 through noon on September 1. (Please note that the meeting dates were changed in order to allow time for those attending the Stockholm meetings to return to Rochester for the Fall Meeting.) Rochester is located on the south shore of Lake Ontario, just adjoining the picturesque region of the Finger Lakes in New York. Dr. Harold C. Hodge, Chairman of the Department of Pharmacology at the University and our host, has indicated that accommodations will be available in the dormitories for registrants, but that he would prepare a list of motels and hotels in the area for those who might prefer this. Meals will be served in the dining room of the Women's Residence Hall. All of the scientific sessions will be held in lecture rooms on the campus of the University, conveniently grouped and close to the registrants' quarters.

There will be a mailing of further details about the Fall Meeting to the membership of the Society on or about May 1. The deadline for the receipt of abstracts for the Fall Meeting will be June 16, 1961. Material to be published in the Fall 1961 issue of "The Pharmacologist" should be in the hands of the Secretary by June 1, 1961. This includes all material for symposia. The Teaching Institute at the Fall Meeting will be under the chairmanship of Dr. C. A. M. Hogben and will be on the subject of "Gastrointestinal Pharmacology."

SURVEY OF GRADUATE EDUCATION IN PHARMACOLOGY

Committee on Educational Affairs

The American Society for Pharmacology and Experimental Therapeutics

The Committee has surveyed the status of graduate education in pharmacology for two consecutive five-year periods, 1950-55 and 1955-60. The data collected in 1955 were reported to the Society at its Fall Meeting in Iowa City in 1955. The survey covering the period 1955-60 has been supported by a grant from the National Institutes of Health to the Committee.

A previous issue of this journal contained a summary of the data of the two surveys of graduate education, collected and analyzed by members of the Committee (Pharmacologist, 2: 53, 1960). This report is to provide the members of the Society with the tabulated data upon which that summary was based.

In addition, Table 11 presents a comparison of graduate education in state supported and privately endowed schools. Of the 96 medical schools, 45 were state supported, 35 were privately endowed, and 16 were supported either by other sources or by both private and state funds.

In both state and private schools total academic staff and total staff participating in graduate education have increased more than 100% since 1955-56; the rate of increase of both categories of staff members has been greater in private schools. In contrast, the rates of increase have been greater in state than in private schools, although the number of pre-doctoral students and non-degree students has increased more than 100% since 1955-56 in both state and private schools, and the number of post-doctoral trainees has more than trebled in both.

Fewer M.S. degrees per year have been granted by private as compared to state schools and relatively fewer private schools have granted M.S. degrees than is true of state schools; for neither category of schools was there a clear trend with time of the total number of M.S. degrees granted.

Roughly the same proportion of private as state schools have granted Ph.D. degrees; the number of degrees per year granted by schools of both types has remained virtually constant from 1955-56 through 1958-59.

The increment in total staff positions held in state supported schools from 1955-56 through 1958-59 averaged 21.3 per year (range: 17 to 26 per year); during these years the number of Ph.D. degrees granted by state schools averaged 25 per year (range: 22 to 28 per year). In contrast, in privately endowed schools the increment in total staff positions averaged 30.6 per year (range: 10 to 48 per year) over the same period, and the total number of Ph.D. degrees granted per year by private schools averaged 21.8 (range: 21 to 23 per year) (Table 11).

Manpower Needs in Pharmacology

One of the Committee's major purposes in surveying graduate education in pharmacology has been to obtain data which might permit estimation of the need for pharmacologists relative to the number of persons trained in pharmacology each year. For the present discussion we shall consider the number of persons trained in pharmacology each year to be the number of persons each year who receive Ph.D. degrees from departments of pharmacology in medical schools, regardless of what other degrees or training the persons might have. This is not to disparage the role of other forms of training in producing "pharmacologists," but to simplify our discussion and to recognize that disciplined training in pharmacology -- and other sciences -- is usually considered to be graduate (rather than postgraduate) in nature and of a duration and intensity which qualifies the student for a doctor's degree.

During the years 1955-56 through 1959-60, about 53 new staff positions in departments of pharmacology were filled each year in medical schools of the United States and Canada. Thirty-nine of these new positions, on a yearly average, were filled by persons who held Ph.D. degrees, with or without other degrees (Table 2). We can anticipate that approximately this number of positions will be available each year in the near future. To the extent that medical school enrollments increase within the next few years, more pharmacologists will be needed on medical school faculties. There is, in addition, a "backlog" of 36 unfilled, budgeted full-time positions in medical school departments of pharmacology in the United States and Canada; in the United States at least, the number of such positions has tended to increase year by year since 1955-56 (J.A.M.A., 174: 1432 et seq., 1960). The survey of the Committee indicates the number of these vacant full-time positions in academic pharmacology in 1959-60 was closer to 53 than to 36.

From the data obtained from the questionnaire circulated by the Committee on Educational Affairs to representative members of the pharmaceutical industry, it can be estimated that for the five years succeeding 1959-60, expansion of departments of pharmacology in this industry will provide employment opportunities for about 10 persons per year who have received doctorates in pharmacology (Pharmacologist, 2: 57, 1960).

It can be estimated, therefore, that in departments of pharmacology in medical schools and in the pharmaceutical industry, there is a potential need of about 49 persons per year who have received a Ph.D. in pharmacology. A tabulation analogous to that of Table 9 was made for survey data for the period of 1955-60, but the data were limited to persons who had received a Ph.D. in pharmacology during the five-year period. Of the 240 such graduates whose present employment was known, 115, or 48%, were employed in academic departments of pharmacology and 46, or 19%, were employed in the pharmaceutical industry. The 49 persons per year who can be anticipated to find employment in

medical school or pharmaceutical industry departments of pharmacology will, therefore, account for about 67% of the total number of such persons who will find employment. Hence, it would appear that within the next few years the number of positions available to persons with a Ph.D. in pharmacology will approximate 73 per year.

During the four academic years from 1955-56 through 1958-59, inclusive, an average of 51 Ph.D.'s in pharmacology have been granted per year to persons trained in medical school departments of pharmacology (Table 5); of these, an average of 49 received their training in a medical school in the United States (Table 8). Of those who received training in the United States, about one in seven was not a United States citizen at the time the training was received (Table 8). Hence, only about 42 persons per year received a Ph.D. in pharmacology and also were readily available for employment in the United States. These 42 persons awarded a Ph.D. in pharmacology thus could fill only 58% of 73 positions estimated to be available per year in the United States and Canada.

The discrepancy between the estimated demand for pharmacologists and the number of persons trained in pharmacology has been met, and could continue to be met, in a number of ways. Some 19% of full-time staff members in United States medical school departments of pharmacology received a major part of their training in pharmacology outside of the United States; 17% received their training in the United States, but not in a medical school (Table 3). Persons with postgraduate training in pharmacology may help supply the need for pharmacologists, but only about 50% of persons who have received such training were citizens (of the United States) at the time they received the training and therefore are not readily available to the employable "pool" of pharmacologists in the United States (Table 8). Persons trained in fields other than pharmacology can and do make important contributions to research and teaching in pharmacology, but their number is difficult to estimate; in the departments of pharmacology in the segment of the pharmaceutical industry surveyed by the Committee, only about one-third of those employees with doctor's degrees had received a doctorate in pharmacology (Pharmacologist, 2: 57, 1960). However, as evidenced by the year by year increase in unfilled positions in medical school departments of pharmacology, the demand for pharmacologists is satisfied only in part by persons trained in medical sciences other than pharmacology.

It is difficult to foretell the degree to which the need for pharmacologists will increase in academic medicine and in pharmaceutical industry; no estimates for future needs for pharmacologists in government, in research institutes, or in industries other than pharmaceutical industry are available. Based on the trend of our survey's data for the last decade, however, it is reasonable to conclude that fulfilling of the demands for pharmacologists with persons trained in pharmacology will require at least a 50% increase, perhaps even a doubling, of the present yearly output of persons with Ph.D. degrees in pharmacology.

Table 1

Graduate Education in Pharmacology in Schools of Medicine, Pharmacy, Veterinary Science and Dentistry in the U.S.A. and Canada. Unless otherwise stated, the data refer to 1959-60.

Category	Medicine	Pharmacy	Veterinary Science	Dentistry
Number of Respondents / Number of Schools Surveyed	96/96	69/76	19/20	41/46
Schools associated with a graduate school*	95%	72%	95%	35%
Departments giving a program leading to an advanced degree*	91%	48%	58%	7%
Number of departments giving a program leading to an advanced degree	87	33	11	2
Departments giving a program leading to a Ph.D. degree*	84%	25%	32%	3%
Number of departments giving a program leading to a Ph.D. degree	81	17	6	1
Total candidates for M.S. degree (1955-60)	366	218	22	2
Total candidates for Ph.D. degree (1955-60)	534	103	15	0
Candidates for M.S. degree (1959-60)	120	52	9	2
Candidates for Ph.D. degree (1959-60)	221	20	9	0
Number of staff members who are members of American Society for Pharmacology and Experimental Therapeutics (1959-60)	312	12	4	4

* As per cent of the number of schools responding to the questionnaire.

Table 2

Total academic staff in 96 medical school departments of pharmacology. Totals for each category are also expressed as a per cent of total staff members for each year. Data for 1954-55 are based on only 72 respondents.

	1954-55	1955-56	1956-57	1957-58	1958-59	1959-60
Total number of academic staff in pharmacology (rank of instructor or higher)	336	417	461	521	594	626
Total number participating in graduate education	223 (66%)	279 (67%)	314 (68%)	354 (68%)	415 (70%)	456 (73%)
Total number with only Master's or Bachelor's degree	33 (10%)	11 (3%)	12 (3%)	14 (3%)	14 (2%)	15 (2%)
Total number with Ph.D. degree, but without M.D., D.V.M. or D.D.S.	142 (42%)	210 (51%)	248 (54%)	278 (53%)	317 (53%)	340 (54%)
Total number with M.D., D.V.M. or D.D.S., but without Ph.D. degree	122 (36%)	132 (32%)	136 (30%)	160 (31%)	181 (31%)	191 (31%)
Total number with Ph.D. degree and M.D., D.V.M. or D.D.S.	49 (15%)	63 (15%)	66 (14%)	76 (15%)	85 (14%)	87 (14%)
Total number with full-time faculty status	273 (81%)	351 (84%)	391 (85%)	447 (86%)	491 (83%)	517 (83%)
Total number with part-time status (1/2 time or more)	23 (7%)	22 (5%)	24 (5%)	25 (5%)	29 (5%)	29 (5%)
Total number with part-time status (less than 1/2 time)	59 (18%)	55 (13%)	57 (12%)	67 (13%)	93 (16%)	109 (17%)
Total number who are members of the American Society for Pharmacology and Experimental Therapeutics	164 (49%)	198 (48%)	215 (47%)	257 (49%)	302 (51%)	312 (50%)
Total number who are members of a Society of the Federation, other than the Pharmacology Soc.	59 (18%)	75 (18%)	83 (18%)	98 (19%)	109 (18%)	115 (18%)

Table 3

Source of training of full-time staff members in United States Medical School Departments of Pharmacology in 1959-60.

	Number	Number as Per Cent of Total
Obtained major part of pharmacological training in a medical school in the United States.	388	64.5
Obtained major part of pharmacological training in the United States, but not in a medical school.	102	16.9
Obtained major part of pharmacological training outside of the United States.	112	18.6

Table 4

Total number of students who received advanced degrees and advanced training without degrees in all Departments of Pharmacology in Schools of Medicine from 1955-56 to 1959-60. There were 96 respondents, of which only 87 departments may give training leading to a degree conferred by their institution.

	1955-56	1956-57	1957-58	1958-59	1959-60
Master's Degree:					
Number of candidates	72	93	91	117	120
Degrees granted	34	41	27	45	--
Ph.D. Degree:					
Number of candidates	146	147	172	192	221
Degrees granted	50	57	48	50	--
Not Working Toward M.S. or Ph.D. Degree:					
Students in professional schools	89	94	113	133	171
Other	1	1	1	6	5
Postdoctoral Students	45	62	71	99	153
Total:	353	397	448	547	670

Table 5

Number of M.S. and Ph.D. degrees granted after training in Medical School Departments of Pharmacology for each academic year from 1950-51 through 1958-59.

	1950 -51	1951 -52	1952 -53	1953 -54	1954 -55	1955 -56	1956 -57	1957 -58	1958 -59
Total M.S. degrees granted	44	41	42	28	24	34	41	27	45
Number of respondents	72	72	72	72	72	96	96	96	96
Number of schools granting one or more M.S. degrees	21	16	15	18	14	25	29	22	27
Number of schools granting two or more M.S. degrees	9	10	10	5	6	8	10	3	14
Range of number of M.S. degrees granted by individual schools	0-9	0-7	0-8	0-3	0-3	0-3	0-3	0-4	0-3
Total Ph.D. degrees granted	18	26	34	43	34	50	57	48	50
Number of respondents	72	72	72	72	72	96	96	96	96
Number of schools granting one or more Ph.D. degrees	6	16	14	20	14	31	36	30	30
Number of schools granting two or more Ph.D. degrees	3	4	11	10	8	11	14	10	12
Range of number of Ph.D. degrees granted by individual schools	0-4	0-4	0-5	0-5	0-4	0-4	0-6	0-4	0-5
Number of M.S. degrees granted per 100 respondents	61.2	57.0	58.4	38.9	33.4	35.4	41.5	28.1	46.8
Number of Ph.D. degrees granted per 100 respondents	25.0	36.2	47.3	59.9	47.3	52.0	59.3	50.0	52.0

Table 6

Three-year moving averages of number of M.S. and Ph.D. degrees, respectively, received after training in Medical School Departments of Pharmacology. Number of degrees are adjusted numbers per 100 respondents. For data through academic year 1954-55, there were 72 respondents; for data from academic year 1955-56 through 1958-59, there were 96 respondents.

Years (inclusive dates)	Number of M.S. Degrees	Number of Ph.D. Degrees
1951-1953	58.9	36.2
1952-1954	51.4	47.8
1953-1955	43.6	51.5
1954-1956	35.9	53.1
1955-1957	36.8	52.9
1956-1958	35.0	53.8
1957-1959	38.8	53.8

Table 7

Sources of all degree candidates in pharmacology for five-year period up to and including 1959-60. Pooled data for 96 medical schools responding, 69 pharmacy schools responding, 19 schools of veterinary science responding and 29 schools of dentistry responding.

Source of Students	Candidates for Master's Degree		Candidates for Ph.D. Degree	
	Number	Number as Per Cent of Total	Number	Number as Per Cent of Total
Medical school students	59	9.7%	15	2.3%
Medical school graduates	23	3.8%	38	5.8%
Premedical students not accepted in medical school	19	3.1%	5	0.8%
Students or graduates in pharmacy	301	49.5%	232	35.6%
Graduates of liberal arts colleges	139	22.9%	233	35.8%
Technicians in academic institutions	15	2.5%	8	1.2%
Technicians in non-academic institutions	7	1.2%	15	2.3%
Veterinary school students or graduates	25	4.1%	17	2.6%
Students with M.S. degrees in fields other than pharmacology	4	0.7%	76	11.6%
Other sources	16	2.6%	13	2.0%
Total	608	100.1%	652	100.0%

Table 8

Citizenship status (at the time training was received) of persons who received advanced training in pharmacology in United States Medical Schools during 1955-1960. There were 84 respondents.

	Number			Per Cent of Total	
	U.S. Citizens	Not U.S. Citizens	Total	U.S. Citizens	Not U.S. Citizens
Received only M.S. degree	113	16	129	87.6%	12.4%
Received only Ph.D. degree	169	27	196	86.2%	13.8%
Received postgraduate training for 3 months or longer	133	151	284	46.8%	53.2%
Received Ph.D. degree or postgraduate training	302	178	480	63.0%	37.0%
Received M.S., Ph.D. or postgraduate training	415	194	609	68.2%	31.8%

Table 9

Employment within 1-5 years of graduation of persons who received advanced degrees in pharmacology (either M.S. or Ph.D.) from Medical Schools during each of two five-year periods. In two questionnaires, distributed in 1954-55 and 1959-60, respectively, respondents were asked to report the "present employment" of their graduates of the previous five years. There were 72 respondents in 1954-55 and 96 in 1959-60.

	Received Degree During 1950-1955			Received Degree During 1955-1960		
Employment	Number	%*	Total %	Number	%*	Total %
Academic: Pharmacology	120	39.8		141	37.9	
Academic: Other Preclinical Fields	27	8.8	52.6%	26	6.9	53.0%
Academic: Clinical Fields	12	3.9		30	8.6	
U. S. Government (except Armed Forces)	34	11.1		24	6.5	
			15.2%			8.6%
Armed Forces	12	3.9		8	2.2	
Pharmaceutical Industry	31	10.2	10.2%	62	16.7	16.7%
Nonacademic practice of medicine, pharmacy, etc.	37	12.1	12.1%	22	5.9	5.9%
Research Institutes	No specific data			20	5.5	
Industry: Other than pharmaceutical	No specific data		9.8%	4	1.1	15.8%
Other	29	9.8		35	9.4	
Total	302		99.9%	372		100.0%

* as per cent of total

Table 10

Financial support of predoctoral students. Number of Medical School Pharmacology Departments, out of 87, receiving various percentages of total support from seven sources. 96 respondents, of which only 87 can give training leading to a graduate degree conferred by their institution.

Source of Support in 1959-60	Number of Schools Receiving Support to the Following Extent of Total Financial Support of Predoctoral Students in the Respective Schools:					
	0%	1% or more	25% or more	50% or more	75% or more	100%
University Budget	34	53	29	11	6	1
USPHS Training Grants or Fellowships	36	51	38	20	18	6
USPHS Research Grants	45	42	15	11	2	2
Grants from Other Government Agencies	69	18	11	8	5	0
Grants from Pharmaceutical Companies	57	30	9	4	0	0
Grants from Non-Profit Institutions	59	28	9	1	0	0
Other	80	7	6	4	3	2

Table 11

Comparison of the growth of academic staff and training in Pharmacology in 45 state supported schools (S) and 35 privately endowed schools (P) from 1955-56 to 1959-60.

	State School (S) or Private School (P)	Academic Year					1959-60 as per cent of 1955-56
		1955 -56	1956 -57	1957 -58	1958 -59	1959 -60	
Total staff members (Instructor and above)	S	190	216	237	254	264	139
	P	158	168	202	250	259	164
Total staff participating in graduate education	S	138	149	162	186	203	147
	P	104	121	146	174	191	184
Total students receiving predoctoral (including pre-M.S.) training and non-degree training not at postdoctoral level	S	154	164	184	222	268	174
	P	82	91	105	114	134	164
Total postdoctoral trainees	S	18	25	29	38	61	339
	P	26	37	41	54	78	300
Number of M.S. degrees granted	S	21	30	21	30	--	
	P	11	8	5	8	--	
Number of Ph.D. degrees granted	S	25	28	22	25	--	
	P	21	23	21	22	--	
Per cent of schools which granted no M.S. degree	S	62%	53%	64%	67%	--	
	P	83%	83%	86%	83%	--	
Per cent of schools which granted no Ph.D. degree	S	64%	58%	64%	67%	--	
	P	63%	63%	71%	63%	--	

GUIDE TO THE WORLD LITERATURE ON CARDIOVASCULAR AGENTS

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The rapid expansion of research activity in Pharmacology during the past decade has resulted in a great increase in the volume of published material. Consequently, it has become exceedingly difficult for scientists actively working in this area to keep abreast of the pertinent literature. The recent decision to inaugurate an "Annual Review of Pharmacology" series best emphasizes this situation.

Experience indicates that the pharmacologist's responsibility for the adequate dissemination of his research findings should not cease with the publication of a paper in a professional journal. The onerous task of abstracting has recently been assigned to the author by many journal editors. Thus, abstracting and its bibliographic twin, indexing, can no longer be relegated to the relatively untrained librarian. The professional scientist must make better provision for the disposition of the products of his intellectual metabolism. As a result, a new learned profession has arisen, that of the "literature scientist."

The pharmaceutical industry has been a pioneer in this venture and was among the first to recognize the need for putting scientists to work on the accumulated scientific literature. The expenditure of large sums of money upon scientific information units on the part of industry constitutes yet another indication that existing methods for the dissemination of research findings are inadequate. Abstracts have become too numerous to read and are sometimes quite uninformative. The index approach seems to provide at least a partial answer to the question of how to keep up with things, particularly in Pharmacology, where one is faced with two entities. The first of these is the chemical or drug, while the second is concerned with the target of its pharmacological activity. A comprehensive, highly detailed index dealing with the pharmacology of a specific physiological system would, it was felt, be of great value to the research pharmacologist and to his clinical counterpart in the field of therapeutics.

In the early days, attempts were made to provide comprehensive publications of encyclopedic scope which would encompass the total sum of recorded knowledge in a specific scientific area. Thus, we have had "Heffter's Handbuch" in Pharmacology, Beilstein and Gmelin in Chemistry, and the Surgeon General's Index in Medicine. By and large, these attempts to control the vast literature turned out to be inadequate to the task, so that today, they are mainly of historical interest.

Several years ago, a fresh attempt was made to provide a new type of "handbuch." This time, the goal was a more moderate one. The very active area of cardiovascular pharmacology was chosen and its scope was delineated. This was not an easy task and specific criteria had to be set up in order to confine the scope of the undertaking. The Cardiovascular Literature Project of the Division of Medical Sciences at the National Academy of Sciences - National Research Council, was set up on a basis of a liberal research grant from the National Heart Institute of the National Institutes of Health. This paper constitutes a short report of this undertaking in the hope that it will be of interest to pharmacologists.

It was decided to collect and index all information published in the polyglot world literature during the past three decades or so, concerning the effects of chemical substances, pure or impure, upon the cardiovascular system. Since most pharmacologically-active substances have, at one time or another, been tested for possible cardiovascular activity, it can be seen that this was an undertaking of some magnitude. Neverthless, it was expected that the backlog of accumulated literature could be satisfactorily handled during a preliminary five-year period. Once currency of coverage were attained, it would be possible to keep up with the ever-increasing literature load with a minimum time lag between publication of results and their appearance in suitably indexed form. Although this goal will not have been achieved when the initial five-year period expires next fall, it can certainly be reached one year later.

A new type of detailed, informative and rather lengthy index entry was developed so that, for example, instead of the entry, "Epinephrine, effect upon blood pressure," the user is told that "Epinephrine → Blood pressure, increases upon intravenous injection in the anesthetized dog." The literature citation is given as a numerical accession number. The same information is also given under "Blood pressure ← Epinephrine," so that the information can be found by looking under the chemical name or under the biological heading. There are several hundred, standardized biological headings, descriptive of the anatomical, physiological and pathological entities affected by the drug. Ample cross-references are provided. A major problem involved the standardization of drug names according to approved generic terminology, in addition to accepted "Chemical Abstracts" nomenclature. The available clinical literature which constitutes the major portion of the index presented very complex problems with regard to the use of plant extracts and formulations. This is particularly true of the myriads of foreign preparations. Pharmacopoeias and various handbooks, such as Marler's "Pharmacological and Chemical Synonyms," published by Excerpta Medica, and German directories by Koschinsky and Bernoulli and Lehman, to mention a few, are available. All of these have by no means been solved to our complete satisfaction.

Since, as pointed out above, each entry consists of at least one and often two or more sentences, and there are hundreds of "Epinephrine - Blood Pressure" types of such entries, these are alphabetized all "down the line." In other words, all "lines of data" which indicate that under certain conditions "Epinephrine will decrease blood pressure," are kept together to facilitate the search.

By laborious correspondence, a staff of non-resident, part-time indexers was recruited and trained. About forty such indexers have been and are still actively engaged in this project. They constitute a good cross-section of the potential users of the index, such as fully-trained pharmacologists, senior graduate and medical students and physicians. Journals containing pertinent information are selected and carefully scanned on a page-by-page basis for pertinent indexable information. It is not necessary to translate foreign language papers since our indexing staff can handle about a score of languages and are able to extract indexable material without formal translation. Titles of papers are translated. The page-by-page scanning procedure, although tedious and time-consuming, has been justified by the large amount of hitherto-"lost" information which this method has unearthed. A paper dealing with, for example, antibiotics, may contain a paragraph or, perhaps, even a single sentence describing the cardiovascular effects of some brew. It is most likely that this bit of information will not have been recorded by conventional abstract or index services. This resurrection of buried information is an interesting feature of our compilation, as is also the mass of negative results, side effects of drugs, etc., which we have been collecting. We are constantly amazed by the sort of information which we are able to find and which is not, to the best of our knowledge, covered by existing bibliographies and indexes.

The identity of the foreign language in which an article has been published is indicated in every index entry resulting from such a paper. This prevents the user from having to look up a paper which he cannot read. Since entries are detailed and informative and convey useful information per se, it may not be necessary to translate the cited paper. In view of our coverage of more than four hundred periodicals, published in a score of languages, this feature is considered most helpful. The more obscure foreign language literature, we have found, is replete with information of the effects of extracts and other chemically ill-defined substances. This type of information has recently become rather popular, as a result of the history of Rauwolfia and so on.

In the course of indexing some 13,000 papers published during the years 1951-55 in four hundred journals, we have come to several conclusions concerning the literature. Observations on the cardiovascular effects of chemical substances, as contrasted with, for example, data on cancer chemotherapy, are widely scattered among a

great number of journals. Not only is this true of the usual "run-of-the-mill" type of clinical observations, but many early, "screening-type" reports on the clinical results obtained with new drugs, can be found in a wide variety of publications. The specialized literature of Anesthesiology, for example, must be carefully surveyed. The use of hypothermia in surgery brings with it a plethora of data concerning cardiovascular pharmacology. Psycho-pharmacology is another active area of information pertinent to our project. It is perhaps surprising to note the large output of pharmacological publications in the Italian and Japanese languages, both of which are quite outside the ken of most American pharmacologists.

The research approach which characterized this undertaking was extended to the question of publication. With at least 100,000 separate, rather lengthy index entries which must be carefully alphabetized, 13,000 bibliographic references in numerical order and some 50,000 author entries, the composition problem is a formidable one. In order to provide for maximal dissemination of this first publication (1951-55) and of succeeding volumes to come, the price must be kept low.

After numerous attempts, a method employing the typing of entries upon IBM cards for use with a step-camera was developed. As a result, a photo-offset edition of some 1,500 pages will be priced quite reasonably.

The uses of this ambitious bibliographic effort are many. The first one which comes to mind is the obvious "What are the cardiovascular effects of a particular compound?" or "Has a particular compound been tested for cardiovascular activity?" If the name of the compound is known or if the "Chemical Abstracts" name can be assigned on the basis of its structural formula, the answer will be found. Details other than those provided by the index entry, such as dosage, experimental design, etc., can be obtained by consulting the original paper which is cited in bibliography. As has been mentioned before, consultation of the original publication may often be unnecessary, especially in the case of negative data. The next group of questions which the index is designed to answer are those concerned with the drugs which have been used to treat a specific condition, or which have an effect on a particular organ, organ system, physiological reflex or other aspects of physiology, such as cerebral blood flow, myocardial excitability, etc. Side effects of important compounds are listed in some detail. Review articles on groups of compounds, such as anticoagulants, are also listed.

It is possible to assemble specialized bibliographies with very little effort, by the use of this "Index-Handbook of Cardiovascular Agents." This is expected to be of advantage to authors of reviews,

dissertations and monographs by circumventing time-consuming searches in library stacks.

It is also possible, although somewhat difficult, in view of existing rules for chemical nomenclature, to assemble information on the cardiovascular effects of structurally-related compounds. Since correlation between the chemical structures and biological activities of compounds is a fruitful area of research, provision has been made for later mechanization of such searches. The IBM cards which bear the index entries and constitute the "manuscript" to be published, can also be easily punched with suitable coded symbols. That is, the structure of the compound listed on the card can be coded by means of one of the many codification systems now available. Its cardiovascular effects can be coded. Punched cards can be mechanically selected in order to answer questions such as "What are the blood pressure effects of compounds containing a benzene ring and an N-methyl substituted propylamine?" Correlations between chemical structural units or pharmacophores and biological effects can best be attained by these means. Our method of publication provides for the codification of most of the information contained in the "handbook" without the necessity of going back to the original literature.

It is perhaps regrettable that our efforts are limited to the area of cardiovascular pharmacology, particularly in view of our laborious page-by-page scanning of a significant portion of the medical literature and certainly the great majority of pharmacological publication. Extension of our approach to the whole of pharmacology is considered quite feasible.

The first fruits of our labor, the large volume covering the 1951-55 literature will shortly go to press, to be followed by the 1931-50 and the 1956 - to-date compilation as soon thereafter as possible. We are anxiously looking forward to the reaction of pharmacologists and other potential users to our effort. The final outcome of this ambitious undertaking in a limited area of medical science will, of course, depend upon the degree of acceptance which is accorded it by a jury of peers.